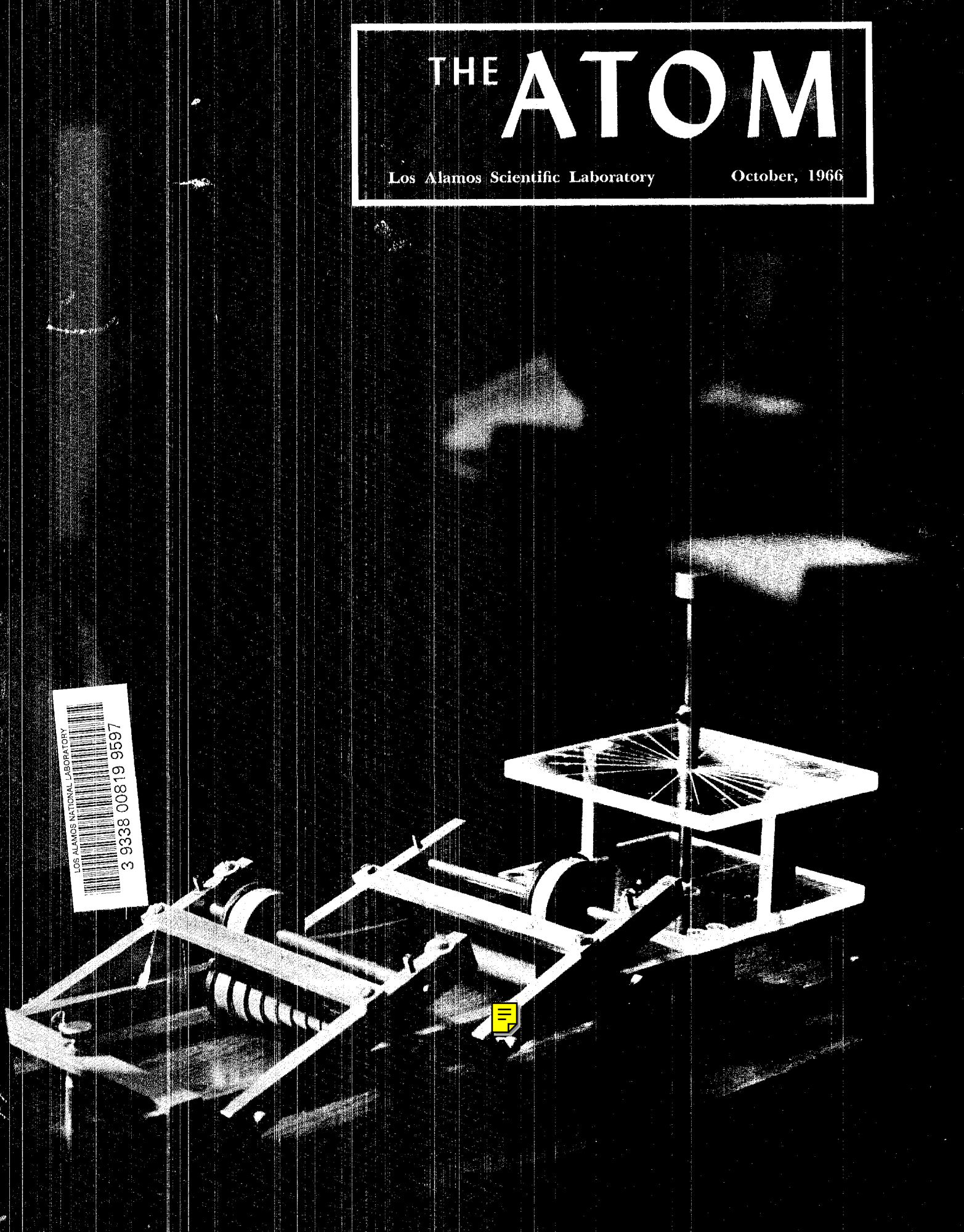
THE ATOM

Los Alamos Scientific Laboratory — October, 1966



Volume 3 Number 10
October, 1966

THE ATOM

Published monthly by the University of California, Los Alamos Scientific Laboratory, Office of Public Relations, P. O. Box 1663, Los Alamos, New Mexico, 87544. Second Class Postage Paid at Los Alamos.

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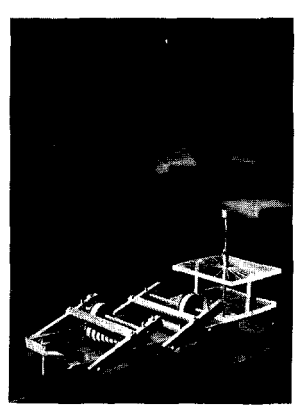
Office: D-413 Administration Building. Telephone: 7-6102. Printed by The University of New Mexico Printing Plant, Albuquerque.



COVER:

A forerunner of the modern computer—invented by Enrico Fermi—was recently unearthed during an office move at the Laboratory. Story begins on page 7.

Ogle Receives Public Service Medal

Dr. William E. Ogle, J division leader, received the U.S. Defense Department's Distinguished Public Service medal at a special ceremony in the LASL Science Museum September 28. Air Force Lt. Gen. H. C. Donnelly, director of the Defense Atomic Support Agency, made the presentation.

The citation, signed by Defense Secretary Robert S. McNamara, recognizes Ogle for exceptional meritorious civilian service while serving in the national nuclear weapons testing program from November, 1944, to January, 1966.

Ogle joined the Laboratory in 1944. He served as a group leader in P division and in J division until 1951, when he became assistant J division leader. He served as associate and then alternate division leader from 1952 to 1965, when he was named division leader.

Ogle participated in the Trinity test and in all Pacific nuclear tests and most Nevada Test Site operations.

In 1959, Ogle served as the AEC delegate to the Geneva Conference on Nuclear Test Suspensions. He received a Department of Defense Award for contributions to Operation Redwing in 1956, and in 1963 he received the U.S. Navy's highest civilian award—the Distinguished Service Medal—for his "outstanding contributions to the Department of the Navy in the field of nuclear weapon technology."

Ogle is a Fellow of the American Physical Society and a member of Sigma Xi and of Lambda Chi Alpha. In 1963 he received an honorary doctor of science degree from the University of Nevada.

Other LASL personnel who have received the Distinguished Public Service medal while employed at the Laboratory include Director Dr. Norris E. Bradbury and the late Dr. Alvin C. Graves who was J division leader at the time of his death in July, 1965. Dr. Ogle replaced Dr. Graves as head of the division.

Gen. Donnelly presents Distinguished Public Service medal to Bill Ogle.

United Fund To Aid 13 Agencies

The annual fund drive for Los Alamos service agencies is under way this month with a new name and a new fund goal. Renamed the Los Alamos United Fund, Inc., in keeping with similar changes in other cities, the project has a goal of $45,615 for the support of 13 service agencies.

Frank K. Tallmadge, assistant for engineering in P division, is general chairman of this year's drive. Ted Russo, ENG-3, is handling the campaign at LASL.

In a statement to employes, Laboratory Director Norris E. Bradbury says, "As in past years the campaign will be conducted on the job.

"Within the next few weeks, volunteer workers will solicit our contributions. How much we give and if we wish to apportion it is, of course, a matter of personal concern. We should keep in mind, however," that the annual drive "is designed as a substitute for separate campaigns by the 13 participating agencies.

"The entire Los Alamos community and many other communities and individuals less fortunate than ourselves will benefit from our making this a highly successful campaign."

The budgets for each of the 13 agencies are available for inspection at the Mesa Public Library. The agencies that will receive funds from the campaign include the American Red Cross, $4,100; Babe Ruth League, $1,500; Boy Scouts, $8,000; Cancer Clinic, $4,000; Family Council, $6,000; Girl Scouts, $8,000; Heart Association, $3,500; Little League, $800; Los Alamos Association for Retarded Children, $4,065; Los Alamos Society for the Physically Handicapped, $1,000; Salvation Army, $4,000; Travelers' Aid Society, $50; and U.S.O., $600. The Lassie League, which has not requested any funds, is also assisting in the campaign. All campaign and operating costs for the year, which will amount to about $1,400, will be taken from the United Fund's reserve instead of being included in the budget.

Tallmadge emphasizes that the decision to contribute to the United Fund belongs to the individual alone, but that whatever that decision is, the campaign card should be returned. Cards may be returned through the group or section representative, through any other representative of the United Fund or to P.O. Box 22, Los Alamos, N.M.

Harder, Butler, Fulwyler Named To Advanced Study Program

Three LASL staff members—Duane G. Harder, T-1, T. Daniel Butler, T-3, and Mack J. Fulwyler, H-4—have been selected to participate in full-time graduate study at the university or college of their choice this year under the sponsorship of the Laboratory's Advanced Study Program.

Harder will study at Texas A&M College toward a Ph.D. degree in mathematics; Butler will attend the University of New Mexico to work toward his Ph.D. degree in physics; and Fulwyler will go to the University of Colorado, Boulder, to complete requirements for a Ph.D. degree in biophysics.

Harder received his A.B. degree in mathematics from Bethany Nazarene College, Bethany, Okla., and his M.S. degree in the same field from Kansas State University in 1962. He is married and has two children. He has been with LASL since June, 1963.

Butler completed his undergraduate work at the New Mexico Institute of Mining and Technology, Socorro, receiving his B.S. degree in mathematics in 1960. He has been a LASL staffer for six years, and is married with three children.

Fulwyler obtained his B.S. degree in physics from Idaho State College, Pocatello, and has been with LASL for the past four years. He, too, is married and has three children.

The purpose of the Advanced Study Program is to provide encouragement for employees to improve their technical competence and thereby enhance their value to the Laboratory.

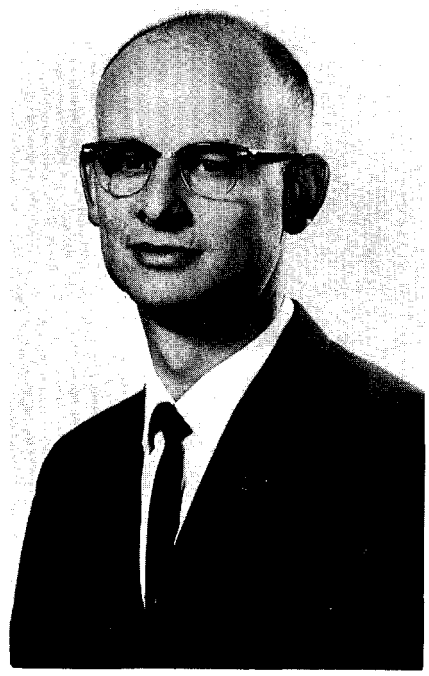
Applicants for the Advanced Study Program must meet the qualifying requirements that they have three or more years of continuous, regular, full-time employment by LASL immediately preceding application; that they have a bachelor's degree plus approximately two years of graduate credits in science or engineering applicable to the field in which advanced study is proposed; and that they have a definite and feasible plan of graduate study in a recognized college or university in the United States.

Candidates are screened by their division leaders and by a special committee of the director. Those selected are retained on partial salary for a period of not more than 12 months while engaged in full-time study. They are also allowed one-half the cost of basic tuition.

Thirty-six staff members have studied under the sponsorship of this program since it began in 1953.

Fulwyler

Butler



Harder

short subjects

Librarian **Lois J. Simons,** with D Division since March 7, 1950, retired September 9. With her husband, David, an employee of Zia Surplus and Salvage, she'll continue to live in Los Alamos for the time being.

Ernest E. North, CMB-7 senior designer, retired September 16. After working 28 years in Milwaukee, Wis., he came to New Mexico in 1954 to work for the Sandia Corporation in Albuquerque as a drafting checker. He joined LASL in March, 1959. He and his wife are making their home in Albuquerque.

Aubon C. Abbott, Los Alamos fire chief since 1948, has retired after completing 23 years of government service. He came to Los Alamos in 1946 as an employee of The Zia Company, and was employed by the Atomic Energy Commission as fire chief in 1948. Chief Abbott and his wife, Anna, who retired from LASL in August, have moved to Ruidoso, New Mexico.

Lowell O. Denny, assistant Los Alamos fire chief since 1952, has been chosen by a selection board to succeed Aubon C. Abbott as chief of the Los Alamos Fire Department.

Denny's promotion became effective October 2.

Denny, a native of Stroud, Oklahoma, has been engaged in fire department activities since 1942. He has been with the Los Alamos Fire Department since 1947.

Alternate T Division Leader **Conrad Longmire** is in Santa Barbara, Calif., on a three-months' leave of absence consulting for the Defense Atomic Support Agency Information and Analysis Center at G.E. Tempo. While there, he will be working on problems relating to nuclear weapon effects.

Longmire will return to LASL about mid-January next year.

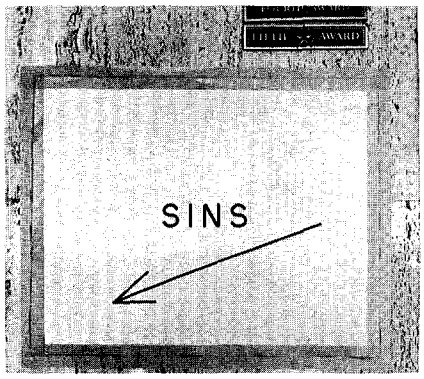
Dr. James L. Tuck, associate P division leader, has been invited to address a seminar on "New Horizons in Science" at Gatlinburg, Tenn., November 2. The seminar is sponsored by the Council for Advancement of Science Writing. Dr. Tuck's topic will be "Project Sherwood: A Discussion of the Controlled Fusion Problem." On October 3 Dr. Tuck delivered the opening talk at the Conference on Science and the Press at the University of Texas. The title of his talk was "Project Sherwood after 15 Years: A Report on the Problem of Obtaining Energy from Controlled Fusion."

LASL Libraries has recently published a bibliography listing unclassified 1965 publications of work done at the Los Alamos Scientific Laboratory. The bibliography includes LASL reports, papers released as non-Los Alamos reports, journal articles, books, chapters of books, conference papers (whether published separately or as part of conference proceedings), papers published in Congressional hearings, theses and U.S. patents. Author and numerical indices are listed. Copies of the report are available from the Libraries.

Eugene Alexander Skweir, a LASL employe at NRDS, died September 13 of an apparent heart attack. The 47-year-old Skweir was an engineer with J-9 and was employed by LASL on July 1 of this year. He is survived by his widow and seven children.

Harry S. Allen and **Robert J. VanGemert,** department head and alternate department head, respectively, of LASL's Supply and Property Department, attended the New Mexico Industrial Procurement Conference in Albuquerque October 7. The meeting was sponsored by the Try New Mexico First Committee of the Albuquerque Chamber of Commerce and U. S. Senator Joseph M. Montoya of New Mexico. Purpose of the one-day conference was to bring together buyers and sellers—primarily in the field of federal purchasing—for the mutual benefit of both. An estimated 150 persons attended.

Scientists Converge On New Mexico —For SINS



This sign in the upper lobby of the State Land Office Building in Santa Fe —instructing delegates on the session location—drew the expected number of comments.

Scientists from throughout the world converged on Santa Fe and Los Alamos last month for SINS.

Don't be hasty, it's not what you may think. It was all quite respectable.

In this case SINS is defined as: (S)eminar on (I)ntense (N)eutron (S)ources.

The Seminar—the first of its kind—was held in Santa Fe September 19 to 23 under the joint sponsorship of the U.S. Atomic Energy Commission and the European Nuclear Energy Agency. LASL served as local host, and one of the highlights of the week-long meeting was a tour of certain unclassified areas of the Laboratory.

Attending the seminar were an estimated 170 internationally known scientists from eight Western European countries, Poland, Japan, India, Canada, Australia, the United States and three international nuclear energy organizations (EURATOM, IAEA and ENEA).

Henry Motz, associate P division leader, was seminar chairman, while H. B. Smets, ENEA, and G. Robert Keepin, N-2, were seminar scientific secretaries.

The needs and technical justification for higher flux sources were presented in detail at the conference.

"For certain nuclear physics experiments, the continously operating high flux reactor is clearly preferable," Keepin noted, "but for studies of condensed matter, a very competitive alternative is the high power pulsed reactor. There is a definite economic advantage to the operation of pulsed systems as intense neutron sources in that they are fast reactors in which the fuel burn-up and poisoning effects are greatly decreased from that encountered in high flux continous reactors."

The success of the IBR pulsed reactor at Dubna, U.S.S.R., has clearly indicated the research capabilities of such systems while operating at only 10 kilowatts of average power, Motz said. A recent proposal, SORA, from the Ispra, Italy, laboratory to build an improved version to operate at an average power of one megawatt received considerable interest.

Although solid state research experiments using pulsed systems offer certain advantages with respect to such factors as simplicity rate of data accumulation, it was pointed out that the conventional or steady state diffraction techniques in use can at the present time produce much more precise data. It was emphasized, however, that present time-of-flight techniques have been developed only during the past few years and can probably be greatly improved.

Thus, the application of time-of-flight methods with pulsed sources was generally recognized as deserving strong support.

"The question has evolved into whether the conventional method (fixed) or the pulsed method (variable) is superior for a continuous source of neutrons," Motz pointed out.

The interplay of these techniques has already generated a number of suggestions with regard to im-

proving conventional methods. This competitive spirit was epitomized by the remark of one seminar participant that "if nothing else, the time-of-flight methods have made the conventional method people think more carefully."

The most intense source is the nuclear detonation. The progress made in utilizing research neutron beams from these devices in Nevada by LASL's P, J and W divisions was reviewed by Ben Diven, P-3. This approach is already providing unprecedented data of great dynamic range and resolution which is of interest to both pure research and applied programs. One participant commented wryly on the lack of "general availability" of this superior source.

The nuclear reaction is not only attained by accelerator bombardment, but also by means of high plasma temperatures. This is the basis of the CTR (Controlled Thermonuclear Reaction) Program, Sherwood, and a very promising device called the dense plasma focus experiment which was described by Joe Mather, P-7. The unusual characteristics of this source—small volume, narrow pulse and relatively high yield at low cost—aroused considerable interest.

In the energy region of 0.1 to a few MeV, particle accelerators continue to be the best neutron sources, Keepin noted, although some argument persists as to which is superior around 1 MeV. The electron linear accelerator is presently outstanding for high resolution work in the KeV range, but there did not appear to be strong support for their further development beyond that envisaged for the Oak Ridge accelerator. In the future, linear accelerators are expected to be most useful not as sources themselves, but as injectors for critical assemblies ("boosters") or, even more important, for pulsed reactors.

It was pointed out that the Los Alamos electron accelerator, PHERMEX, represents a large step forward in this field, but no definite plans for applications to neutron sources are foreseen.

An entirely new approach to the very intense neutron source problem has been proposed in recent years by Chalk River (Canada) and is called ING (Intense Neutron Generator.) This approach, described at SINS, utilizes a high current (65 milliamperes), high energy (800 MeV) proton accelerator and produces neutrons by means of the evaporation-spallation process.

continued on next page

Morgan Hall of the State Land Office Building in Santa Fe provided an "ideal place for a seminar of this type" in the words of one participant.

SINS . . .

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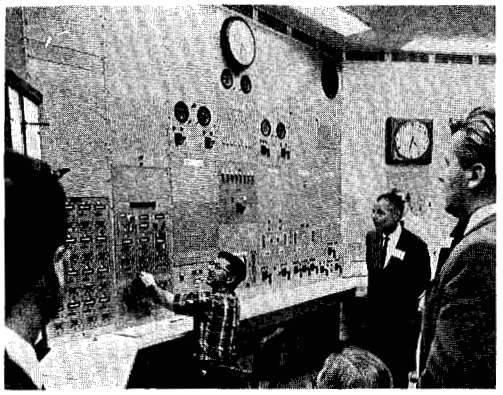
The Los Alamos proton accelerator, LAMPF, although of a far higher intensity than any existing machine, is expected to have a one milliampere beam.

Until very recently, the ING proposal was designed around the SOC (Separated Orbit Cyclotron). However, the advances in design of linear proton accelerators made by the Los Alamos MP division have apparently convinced Chalk River Laboratory scientists that they should adopt a similar design.

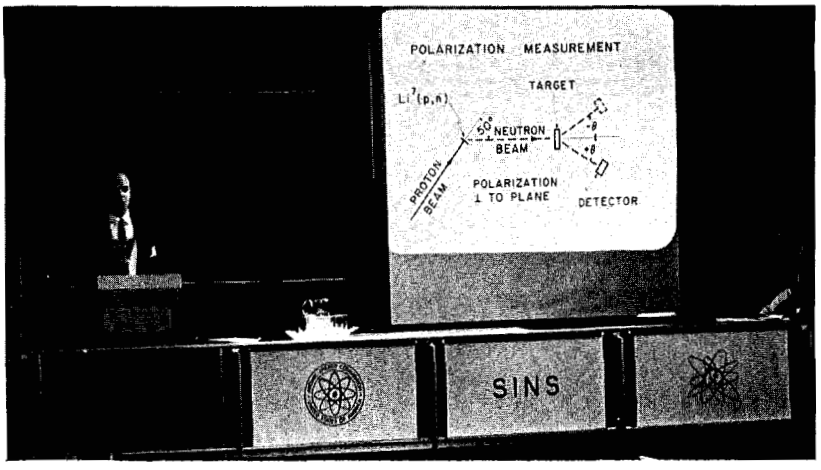
"The interest and incentives for more intense neutron sources were evident among the excellent representation at the seminar, and the only disparity appears when one attempts to optimize a single source for many different types of experiments simultaneously," Motz said.



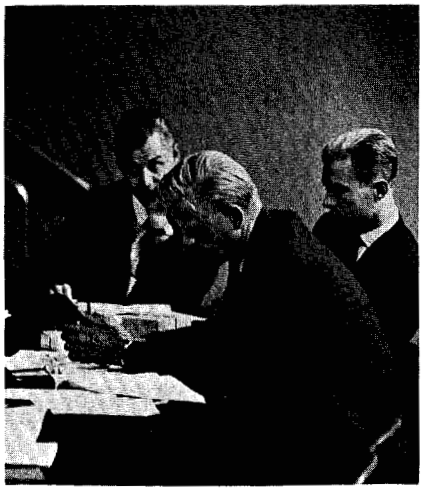
One of the highlights of the afternoon portion of the tour of LASL was a control room for the Kivas at Pajarito Site. Silvio Balestrini, N-2, demonstrated the control panel.

Darragh Nagle, MP-4; Geoffrey Hanna and J. C. Douglas Milton, both of the Chalk River, Canada, Laboratory, express keen interest. . .

. . . in a presentation by Lowell M. Bollinger of Argonne National Laboratory.



Marge Rector, P-DO, acted as "Gal Friday" to the 170 participants at the seminar.



Much of the credit for the planning and smooth running of SINS belongs to H. T. Motz, associate P division leader, LASL; G. Robert Keepin, N-2, LASL; and Henri B. Smets, ENEA.

Fermi Invention Rediscovered At LASL

Listening to the clatter and whir of a room-size modern computer, it is difficult to imagine that a quiet little brass gadget with only a couple of moving parts could be one of its not-too-distant ancestors. But the little "machine" that looks as though it might have come from a toy shop was a useful tool for a group of now-widely-recognized LASL scientists as recently as 17 years ago.

Invented in 1947 by Enrico Fermi, frustrated by the unavailability of the then-new electronic computer, ENIAC, this little 13-inch-long hand-operated computer was constructed by L. D. P. King, then F division group leader at Omega Site and now director of flight safety for the Rover program.

After about two years of use, it was put aside in 1949, when the new, fast electronic computers became generally available. All but forgotten, the little machine was unearthed recently, dusty and tarnished, during an office move. Now polished and mounted on a walnut slab, it will soon be added to the exhibits in the LASL Science Museum.

The infant computer—which never really had a name—was used to trace the histories of neutron movements, making use of a computational technique known as the "Monte Carlo" method. Since its recent resurrection, several of the LASL scientists who used the gadget have suggested naming it the Fermi trolley, the Monte Carlo trolley, or the Fermiac, all appropriate since this Fermi invention which made use of the Monte Carlo method actually was a predecessor of ENIAC and MANIAC.

Stan Ulam, research advisor for LASL and T-3 group leader; Carson Mark, F division leader; N. C. Metropolis, inventor of the MANIAC; Bengt Carlson, T-1 group leader; and Robert Richtmyer, for-

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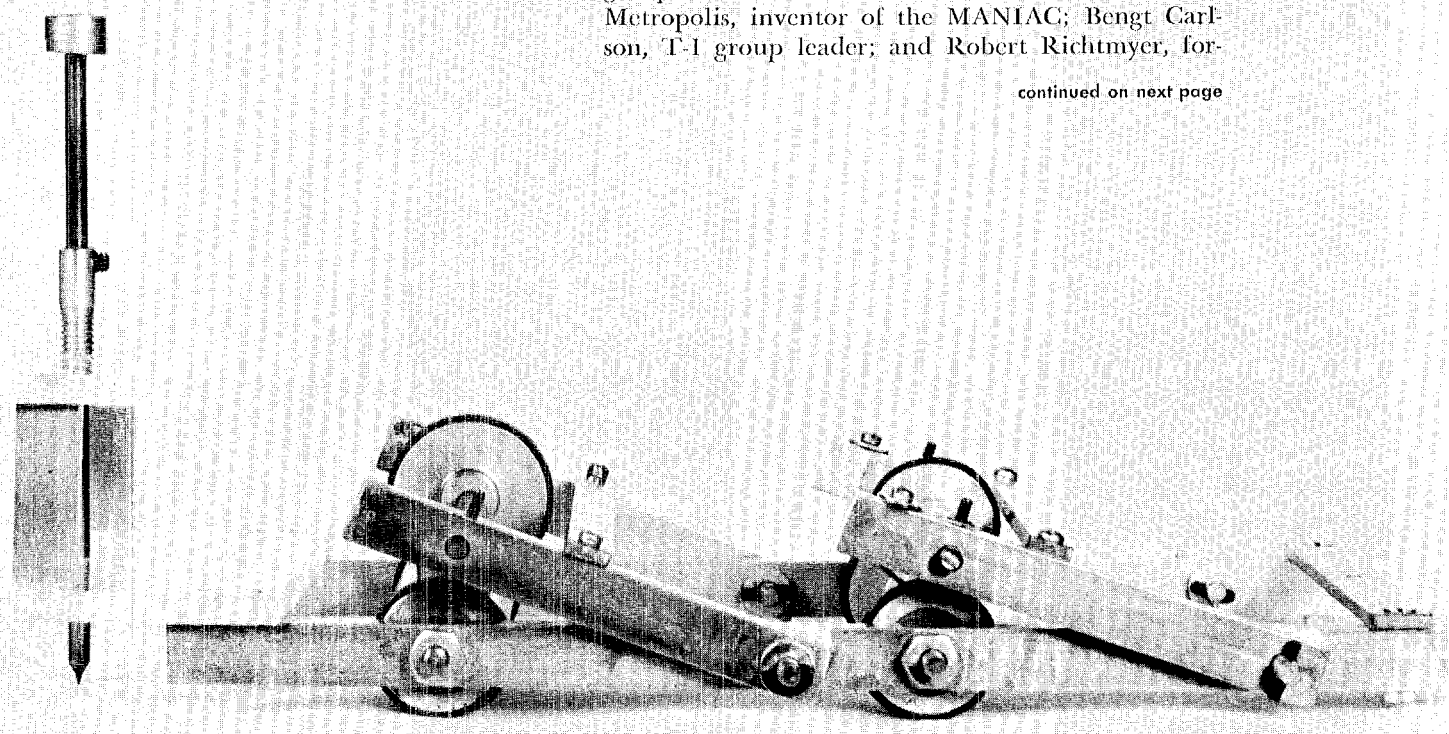

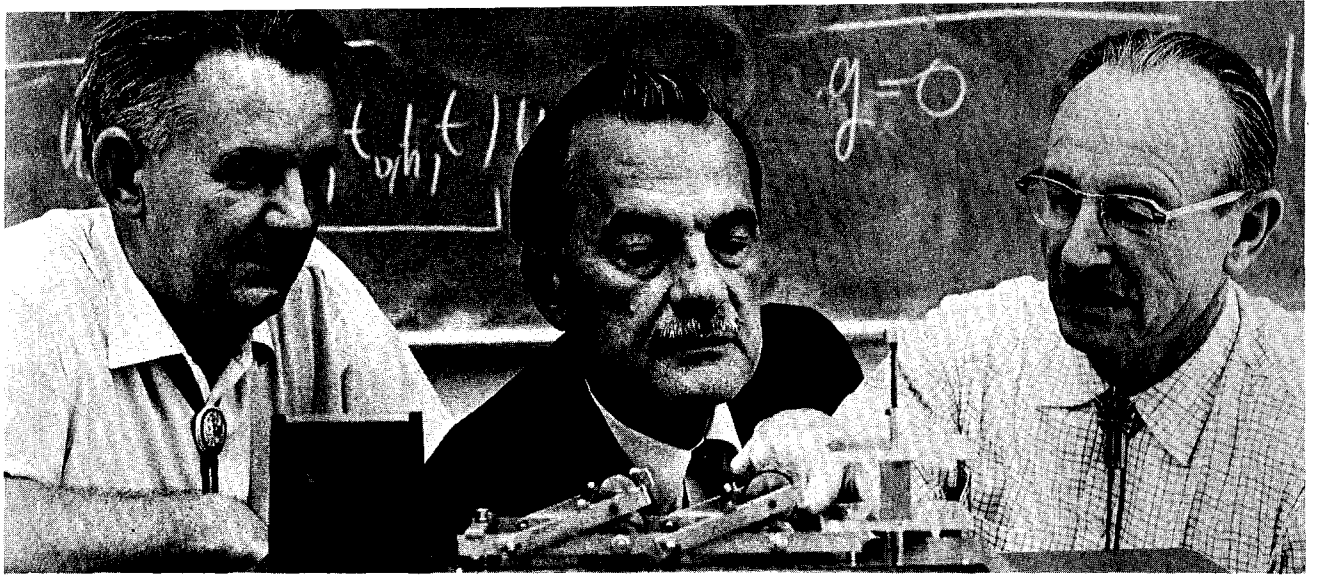

Bengt Carlson, N.C. Metropolis and L. D. P. King, who used the Fermiac some 18 years ago, suggested it be placed in LASL's science museum.

Fermiac . . .

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mer T-Division leader and now Laboratory consultant, the first scientists to use the Fermiac, formulated various types of calculations by the Monte Carlo method.

Ulam had first suggested a statistical method for handling neutron problems in 1946. With fast electronic computers on the horizon, it seemed to be a practical method for studying the behavior of collections of neutrons. Early in 1947, John von Neumann, professor of mathematics at the Institute for Advanced Study and Laboratory consultant, worked out a step-by-step procedure for such calculations.

"This meant generating individual neutron histories as dictated by random mechanisms—a difficult problem in itself," Metropolis explained. "Thus, neutrons could have different velocities and could pass through a variety of heterogeneous materials of any shape or density. Each neutron could be absorbed, cause fission or change its velocity or direction according to predetermined computed or measured probability. In essence, the 'fate' of a large number of neutrons could be followed in detail from birth to capture or escape from a given system."

But there was a lull in the utilization of the ENIAC (electronic numeral integrator and computor) which was under development by Aberdeen Proving Grounds on contract with the University of Pennsylvania and was being moved from Philadelphia to Aberdeen.

This is when Fermi came to the rescue. A member of the Laboratory staff during the war years, he had returned to the University of Chicago but continued to serve as a consultant for LASL. So when he made his customary summer visit in 1947, he found the LASL men frustrated at having a computer technique and no appropriate computer on which to use it.

"But Fermi's agile mind was accustomed to coming up with solutions for the most difficult problems, and this was no exception," King recalls. "He suggested making a quick and inexpensive mechanical device which would provide at least some answers using the Monte Carlo method for treating neutron systems.

"During the war years when Fermi resided at Los Alamos and was in charge of F Division, he was accustomed to coming down to Omega Site almost every day. He used the Water Boiler reactor and Omega Site as sort of a relief valve from the pressing discussions and theoretical work going on in the main technical area. It was therefore quite natural that he would turn here to get something made that was very close to his heart," said King.

It was at a family picnic in Santa Clara Canyon that Fermi and King first discussed the possibilities of such a device.

"Fermi obviously had something on his mind, for no sooner had we deposited our respective families on a nice, grassy picnic spot next to the stream than he suggested we walk along the canyon," King said.

"The idea of applying some sort of a moveable mechanical device to follow hypothetical neutron tracks as they progressed through various material regions was quite new to me. He therefore had to do considerable explaining. In his usual clear, simple manner he explained the whole scheme in detail, starting with an explanation of the Monte Carlo method as applied to neutronics.

"It was a memorable occasion for me to walk and talk for over an hour with this great man in the

beautiful canyon surroundings and to feel that I could make a contribution to something he thought was important to the LASL effort."

So King spent a little overtime with Fermi in the Omega shop to come up with an overall design which would meet his requirements.

"The most difficult part," said King, "was to make the 10-step roller which would roll out the neutron range in the particular material in question. I still have the first one of these I made, since, on the last step, I turned the brass down until it got too thin and the end broke off. Fermi wanted all the diameters turned down to an accuracy of at least a mil. This posed a little problem in getting the rubber tires just right, but we finally got it done."

After Fermi went back to the University of Chicago in the fall, Bengt Carlson's T division group successfully used the little brass Fermiac until the fast multimillion-dollar electronic computers arrived.

"Although the trolley itself had become obsolete by 1949, the lessons learned from it were invaluable," Carlson said.

The Monte Carlo method for computations is still extensively used. But now scientists feed their information into a huge and complex electronic computer--instead of pushing a toy-like gadget across a piece of painted cardboard.

The "trolley" was rediscovered recently when Carlson changed offices, and, said King, "The Los Alamos Science Museum seems like a fitting place for this brainchild of Fermi's."

Several of the men who used the Fermiac or trolley in the late forties--including Ulam, King, Carlson and Metropolis--got together after its "resurrection" and prepared a detailed explanation of how it works.

An example of one of its uses is to determine the change in neutron population with time in numerous types of nuclear systems. The neutron population would either increase, decrease or remain constant, representing a supercritical, subcritical or critical system, respectively.

The three basic steps involved in using this primitive little computer are:

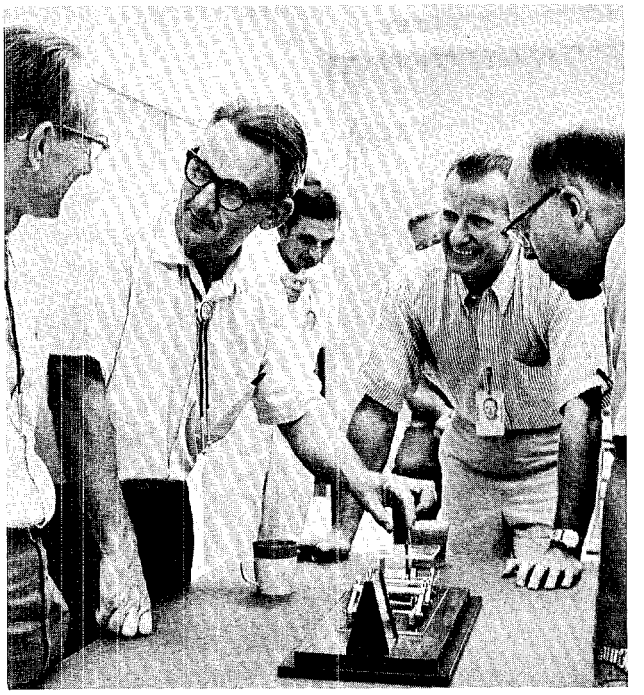
First, to determine the site of the first collision or possible escape of each of the source neutrons (100 were initially used). This is accomplished by statistical considerations based on the detailed characteristics of the particular type of material being traversed as well as by the velocity of the neutron under consideration.

Second, to establish in a similar manner the nature of the collision for each neutron. This can be either an elastic collision or an absorption leading to inelastic scattering or fission--if the material re-

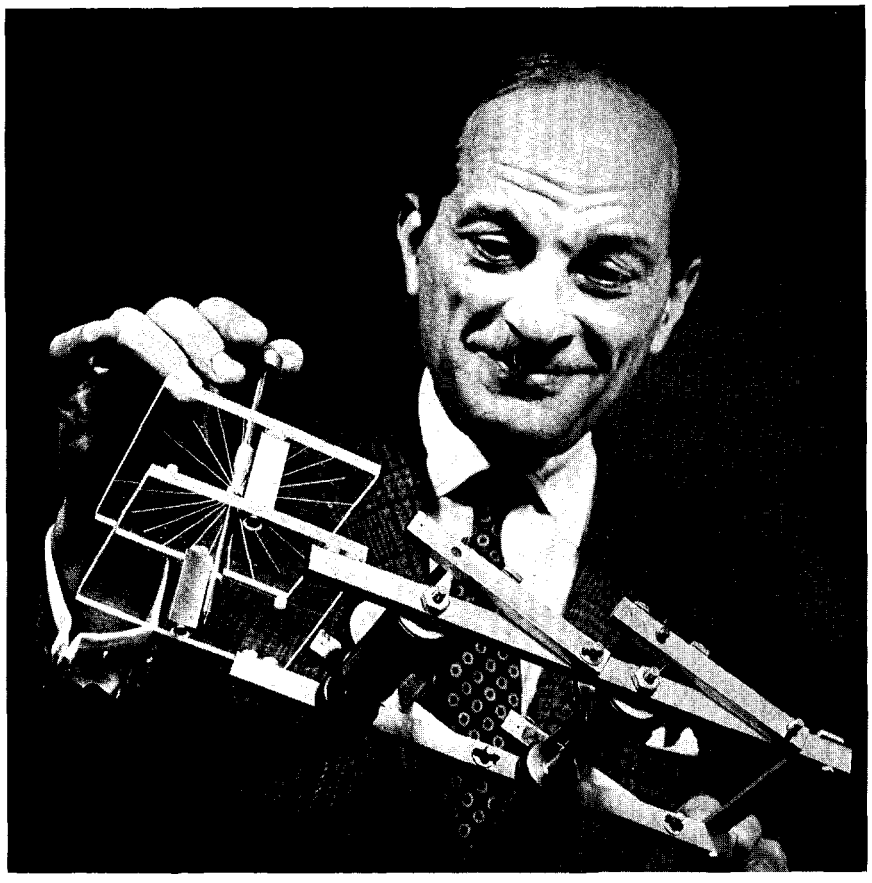
continued on next page

Enrico Fermi and L. D. P. King chat at a 1946 party.

Fermiac, on its museum mounting, was quite an attraction in T-1. King chats with T-1 Group Leader Bengt Carlson as Fred House, Paul Harper and Tom Jordan look on.



Stan Ulam, who in 1946 suggested a method for handling neutron problems on a computer, holds the first "computer" used for that purpose.



Fermiac . . .

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gion is fissionable. The details of these interactions in turn were based on statistical considerations reflecting the experimental and theoretical knowledge of such processes.

The third step in following the "fate" of each neutron depends on the specific outcome of the first two steps:

If the collision is elastic, the direction of motions of the neutrons is the only change, and the neutron is again followed to its next collision site.

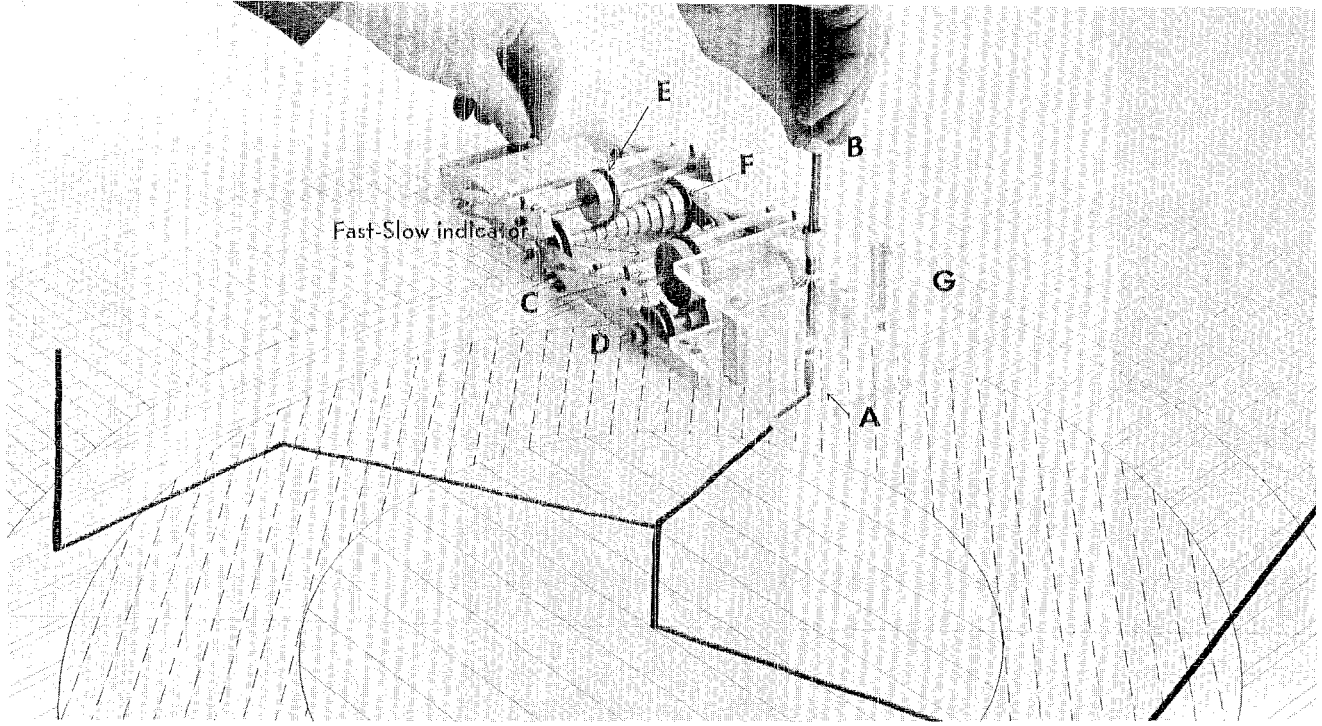
If the collision results in an inelastic scattering event, the neutron undergoes a change in both direction and speed, and again the new motion is followed to the next collision.

If the neutron collision leads to fission, the history of this particular neutron is terminated. However, the several neutrons of the new generation created by the fission process are separately followed in a similar manner. In this way a "geneology" for each of the source neutrons is established.

If the neutron crosses the outer boundary, it is considered to have escaped, and its history is terminated.

From a large collection of these geneologies the behavior of the physical system may be inferred —that is, whether the weapon or reactor design under consideration is a critical, subcritical, or a supercritical assembly, King explained. His more detailed explanation of how the Fermiac operates is on the following page.

Said King, "The trolley is one more example of Fermi's genius to come up with a solution to a then-difficult problem. He had a fantastic ability to comprehend, digest and simplify any challenging theoretical problem and devise simple experiments to supply answers to unknown quantities."



How the Fermiac Operates . . .

King explained that before the Fermiac or trolley is operated, a scale drawing of the nuclear device under study must be made. This is idealized as a set of concentric shells of different materials which, in the drawing, appear as circular rings to represent the planar projection of the materials. A reference base line runs through the center of the system. The physics data about the device and a table of random numbers are also used.

After an initial collection of source neutrons is decided upon, the following steps are performed:

(1) The tip of pointer A is placed on the location of one of the source neutrons. Knob B is used to raise or lower the pointer tip to permit forward motion, a precise positioning, or rotation, if necessary, about the collision point.

Calibrated wheel C measures the elapsed time based on the velocity of the particular neutron in question. Wheel C is turned to zero and set on the drum D to position *F* or *S*, representing fast or slow neutrons, as the case may be. King noted that when the first problem was being worked out, it was discovered that the F and S initials were reversed. A piece of paper tape with penciled letters now corrects this error.

Wheel E is calibrated to measure the distance traveled by the neutron between collisions based on neutron velocity and the properties of the material being traversed. These two characteristics are obtained by proper placement on the multistep drum F, which represents the type of neutron as well as the particular type of material at the position of the pointer.

(2) Next, a random digit is selected and the trolley rotated about the pointer A until the ruling on the lucite platform G coincides with the selected direction. The lucite platform serves as a neutron direction selector. Two sets of 10 directions give the appropriate direction in the planar projection from a three-dimensional system.

(3) Another number is then selected and interpreted as the distance to the next collision. The trolley is then rolled forward until the reading on the wheel E corresponds to this number. If the pointer passes over an interior boundary en route, the trolley is stopped momentarily to permit a shift of the wheel E to a different drum diameter on F to reflect a change in medium. The trolley then continues in its original direction. On the other hand, if the pointer A crosses an outer boundary, the neutron escapes from the system and is no longer followed.

(4) When the trolley has arrived at the next collision distance as determined by the position of wheel E, the nature of the collision is determined by picking an appropriately selected random number.

In the case of an elastic collision, the trolley proceeds as described in 3 and 4 after setting wheel E to zero.

In the case of an inelastic collision, a similar procedure is followed except that now wheel C and, hence, wheel E may have to be repositioned on their respective drums to take care of any change in the neutron velocity.

In the case of fission, that neutron history is terminated, and the trolley begins to follow the history of one of the new generation of neutrons created by the fission process. In due course the trolley returns to this point to trace out the geneology of the remaining neutrons of this fission event.

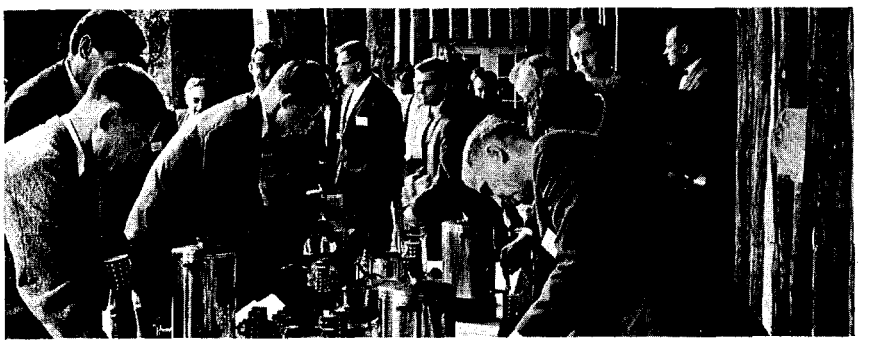
LASL Hosts Accelerator Conference

A conference on linear accelerators, the first large-scale accelerator conference ever held in Los Alamos, began October 3 with some 120 visiting scientists and engineers attending sessions at The Lodge, headquarters for the week-long event.

LASL was chosen as the site for this conference in recognition of the Laboratory's interest in this field and of its outstanding contributions during the past few years.

Dr. Louis Rosen, head of the LASL MP Division, noted that linear accelerators have proved to be of great importance in the study of nuclear forces, nuclear structure and neutron-induced reactions such as occur in reactors; as injectors to very high energy accelerators; and as sources of X-rays in industry and medicine.

LINAC meetings took place in old dining room of Lodge.



LINAC participants have coffee break on Lodge patio.

It is anticipated that LASL will reap many benefits from this conference, since during the next year the Laboratory will complete a design for the highest-energy and highest-intensity proton LINAC ever built. This accelerator is expected to contribute greatly to many phases of nuclear science as well as to radiochemistry, solid state physics and biophysics. It is also expected to lead to numerous practical applications of high levels of radiation, including radiation therapy with pi-minus mesons.

Among the conference participants are Dr. W. K. H. Panofsky, director of SLAC (Stanford Linear Accelerator), the highest energy and largest accelerator in existence; Dr. J. P. Blewett, director of the Advanced Accelerator Development Division of the Brookhaven National Laboratory; Dr. E. J. Lofgren, who is responsible for the Berkeley Bevatron; Dr. T. H. Johnson, former director of the USAEC Division of Research; P. R. Tunnicliffe, director of the Chalk River (Canada) Accelerator Project; Dr. L. C. Teng, director of the Particle Accelerator Division of Argonne National Laboratory; and Dr. F. E. Mills, head of MURA (Midwestern Universities Research Association).

Industrial Health Is Meeting Topic

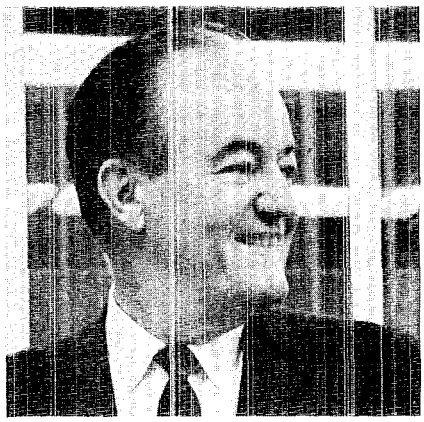
A Health Protection Conference —touching on several phases of industrial health and hygiene—was held in Los Alamos October 12 and 13.

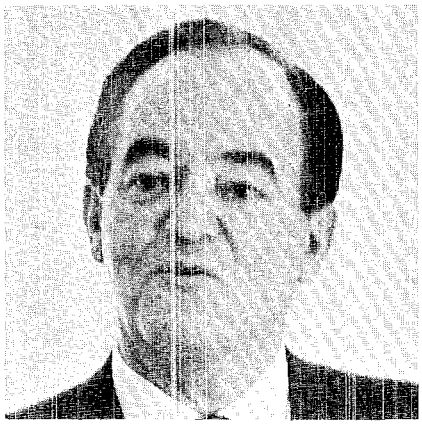
The Los Alamos Scientific Laboratory and the Los Alamos Area Office of the Atomic Energy Commission served as hosts for the meeting which is sponsored by the Operational Safety Division of the Albuquerque Operations Office of the AEC.

This was the third annual meeting on health and safety for AEC contractors under the Albuquerque office. The conferences are held at different places in the region each year.

Among the topics discussed during the two-day meeting were a panel discussion on water, air and soil pollution; "The Industrial Physician's Role in an AEC Plant"; "Preliminary Report on a Remote Area Monitoring System"; "Protective Clothing—An Industrial Hygiene Viewpoint"; and "Burial of Radioactive Wastes at Los Alamos."

Delegates to the conference were also taken on guided tours of sections of the Laboratory.





The Vice President Visits The Hill

Vice President Hubert H. Humphrey lived up to his tag "Hurricane Hubert" last month when he toured portions of the Los Alamos Scientific Laboratory.

From touchdown to takeoff the vice president was in Los Alamos for only three hours. But in that relatively short period, he:

--Shook hundreds of hands, including a number through the barbed-wire fence at the airport. A crowd of about 200 was present to greet Humphrey, despite the hopes of the Secret Servicemen that the arrival would be unnoticed.

--Received a classified briefing on weapons research. This briefing was held in the "Blue Room" in the Administration Building--a restricted area which contains cutaway models of nuclear weapons. While Humphrey was being briefed, curious Secret Servicemen were asking LASL personnel for information on the models.

--Toured the Physics Building and received information on the proposed Meson facility. A newsman awaiting the vice president's arrival in front of the building caused a mild flurry of panic when it was discovered he is an alien. However, after checking the reporter's credentials--he is a Canadian citizen--it was decided he could not be prevented from doing his job, and the matter was dropped.

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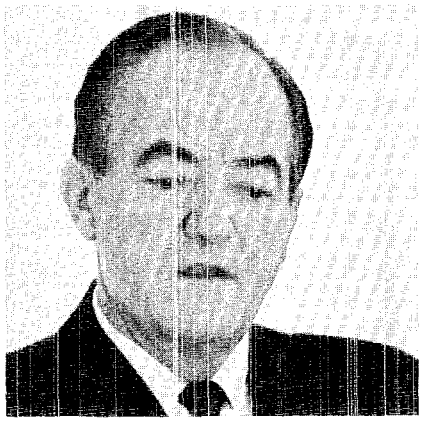
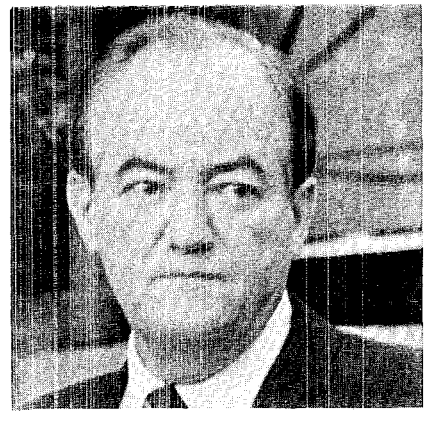
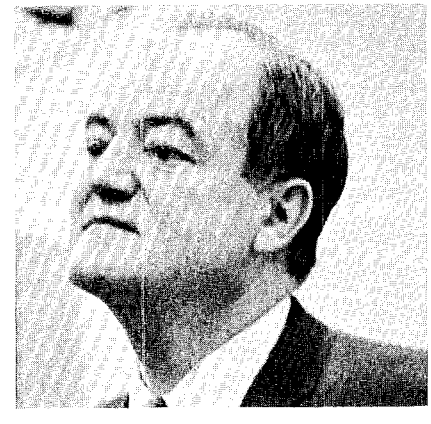






The vice president began shaking hands shortly after his arrival at the airport . . . and continued up until his departure three hours later.

He received a top-secret classified briefing. . . .

Humphrey . . .

continued from preceding page

—Was briefed on Project Rover and visited a Kiva at Pajarito Site. While Humphrey inspected a mock-up of the Phoebus reactor, his aides inspected the old Indian caves in the nearby cliffs.

—Toured the science museum where he manipulated the manipulator in the mock-up of a hot cell. After a short reception and a brief news conference, the vice president left for the airport and a flight to Santa Fe.

While Humphrey was shaking hands outside the front door of the museum, the following conversation between a small boy and his mother was overheard:

"*Mama, who is that man?*"

"That's the vice president—Mr. Humphrey."

"Is he important?"

"Yes, honey."

"As important as Jesus?"

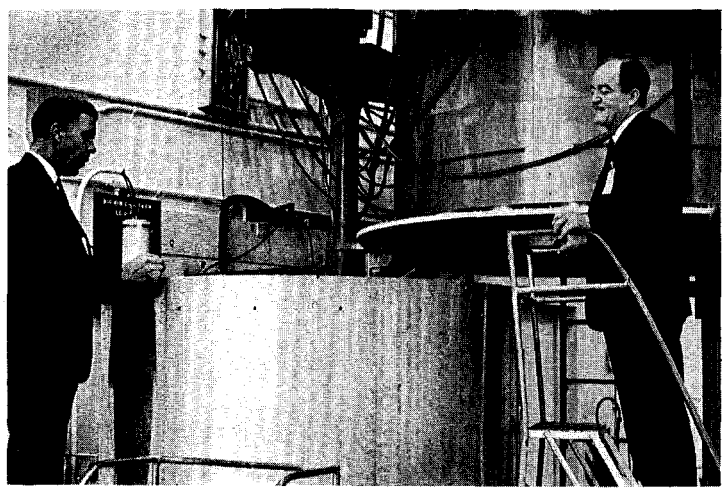
The mother's answer, if there was one, was drowned out by the laughter of the vice president who had also tuned in on the conversation.

At the news conference, Humphrey praised the Laboratory and its work and added, "I have a feeling that what this facility needs will be provided." He also noted that LASL Director Dr. Norris E. Bradbury is held in high esteem in Washington.

The visit by Humphrey and his small official party of aides and Secret Servicemen was apparently a last-minute decision. It was known he was coming to New Mex-

Humphrey was briefed on the Rover Project. . .

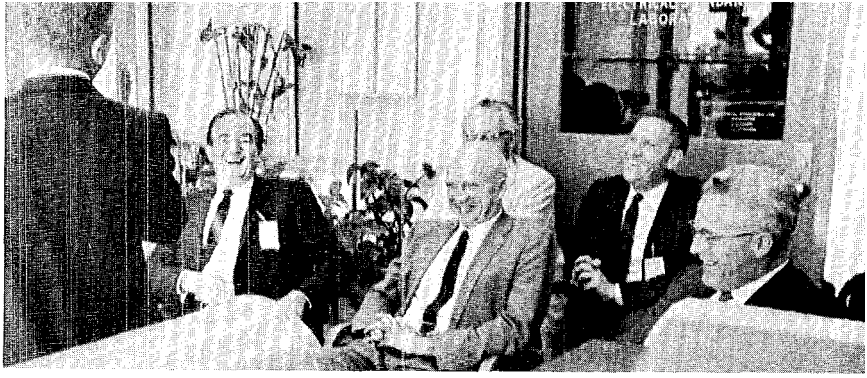
. . . then visited a Kiva for a first-hand look.



. . . after which his aides and secret servicemen scurried to their cars for the next stop.

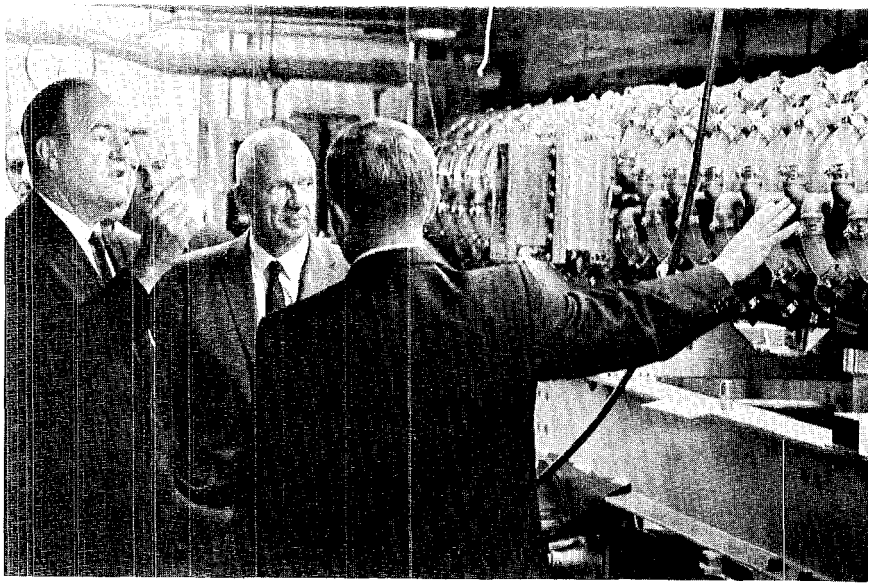
ico for a dinner in Albuquerque and a weekend of rest in the Santa Fe area, but there was no advance warning he would come to Los Alamos—until late Friday, Sept. 9, the night before his visit. At that time the vice president's Washington office notified the Laboratory of the impending visit, and it was confirmed the next day that Humphrey would indeed spend a few hours in Los Alamos that afternoon.

Preparations were hastily made for the visit, and indications were it was a success.

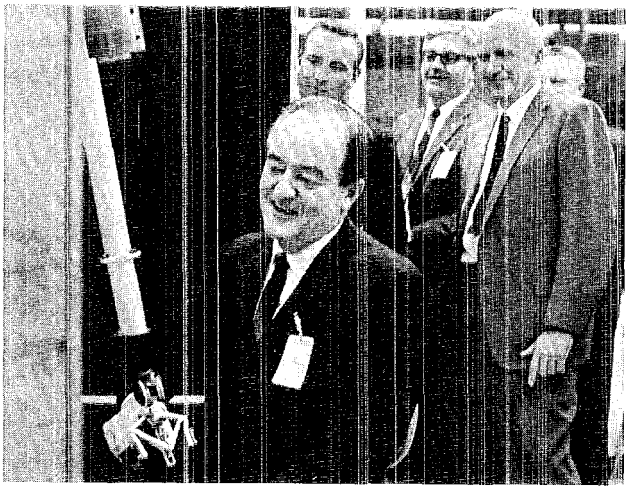


Louis Rosen, MP division leader, brought a laugh from Humphrey. . .

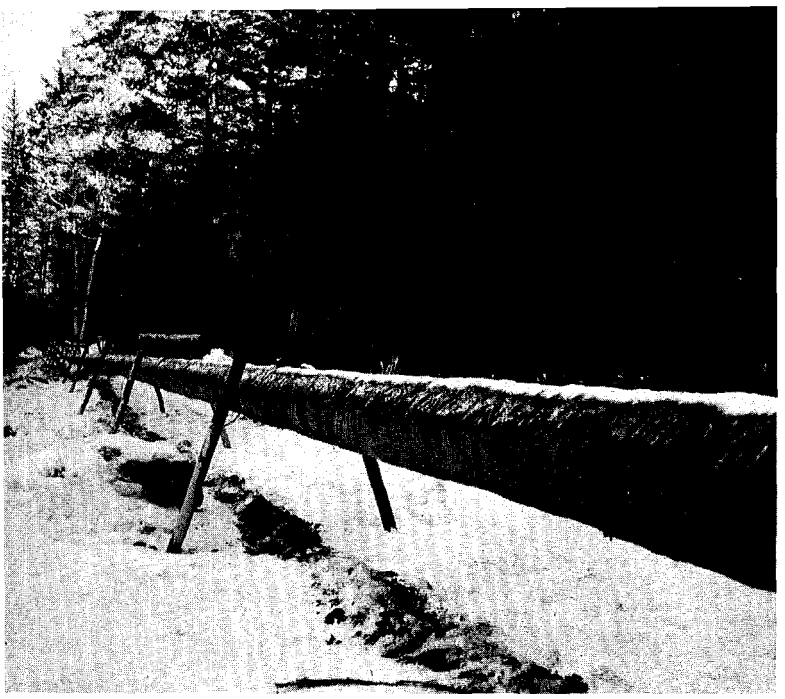
. . . but later, the vice president's sharp mind raised a question for Rosen.



The vice president's final stop was the museum where he tried his hand at the manipulator. . .

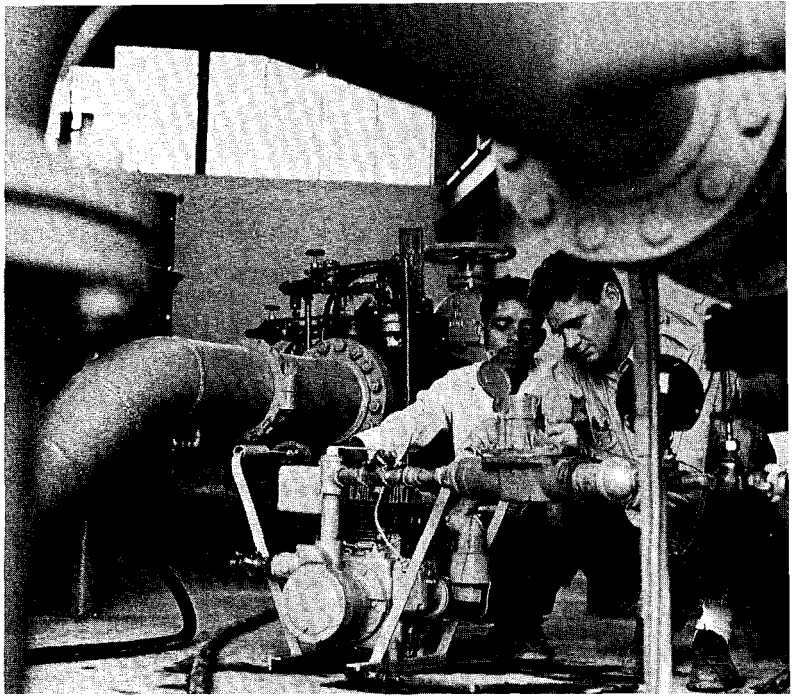


. . . and was assured LASL's gold bar would not leave the country.



THE OLD . . .

"Crisis of '45" occurred when above-ground water pipe—the Hill's chief water source—froze, and water had to be hauled from the Rio Grande.



. . . AND THE NEW

Solomon Martinez, left, and Phil Crume, both of Chaney and Hope, construction contractor for Pajarito line, check water pressure at Pajarito Booster Station No. 2.

Hill's Water Supply Continually Improving

By MARGE ORTH

Los Alamos, with the long-range water supply program presently under way, can expect to have enough water for all reasonable foreseeable needs into the early 1980's, according to AEC planners.

These words, especially to old-timers, are indeed comforting. As any early-day resident will attest, the history of the Los Alamos water supply has been fraught with crises and shortages, which, at certain times, must have seemed insurmountable.

From its establishment until 1921, the sole water supply source for the Los Alamos Boys' School was a dug well, about 15 feet deep, located on the floor of Los Alamos Canyon. The supply from this well became inadequate for the needs of the school and dried up entirely in 1921. In that year a pipeline was constructed in Los Alamos Canyon to a spring located some distance below the present dam. Water from this spring was conveyed through the pipeline by gravity to a wooden tank at the school.

In 1942 the Boys' School began construction of an impounding reservoir in Los Alamos Canyon at a point some two miles upstream from the original shallow well, and they extended the pipeline laid in 1921 to the reservoir.

In 1943, the year the Laboratory was established, the late Herbert W. Yeo, then state engineer, was asked to determine whether the Los Alamos water supply was adequate for future needs. Mr. Yeo, in response to his question as to projected population of Los Alamos, was told "no more than 250."

Perhaps the most famous water problem is the oft-mentioned "Crisis of '45," which threatened the very future of Los Alamos' existence. The chief water source of that time, the Guaje Reservoir pipeline, froze in December of that year, and water was hauled to The Hill in tank trucks from a sump near the Rio Grande. As if that weren't problem enough, the reservoirs went dry early in the summer of 1946 because of drought. More than four and a half million

gallons of water were brought up to Los Alamos from the Rio Grande that time.

Water, perhaps the most precious liquid known to man, has always been a short, much-sought-after commodity in the Southwest. The basis of laws governing water rights in New Mexico to this day is the Desert-Land Act, a federal statute passed in 1877, which states that the right to the use of water in arid-land states, including New Mexico, can be acquired only by prior appropriation for beneficial use.

However, all surface rights in the Rio Grande Basin were fully appropriated even by 1907, when the Bureau of Reclamation made a blanket filing to appropriate all remaining flow as a preliminary step to organization of the Elephant Butte project.

Los Alamos, then, turned to underground sources. Its first wells were drilled in 1946 following the reservoir drought. There are now six of them, known as the Los Alamos Canyon well field, located alongside State Road 4 in lower Los Alamos Canyon, a few miles down the hill from the east entrance to the town. They are still in operation.

But since the Los Alamos Canyon well field supplied only immediate water needs, an additional field was chosen, this time in Guaje Canyon. Six wells, located along the road that leads to the pumice mines, were drilled here, too, some of them more than 2000 feet deep. These wells began producing in early summer, 1951. One well has since become less productive, but another well has been drilled to maintain the well field output.

Until 1960, the town had also been using surface water. But water from Los Alamos and Guaje Reservoirs and a number of small springs was cut off by the AEC that year because of turbidity and chlorine residual problems associated with spring and summer surface runoff. For a while the cutoff decreased water resources, as this water constituted more than one-ninth of the town's then-current water supply.

To facilitate its future planning, AEC requested W. F. Turney and Associates, architect-engineer, to prepare a report on the needs and requirements of the Los Alamos water supply system. The Turney Report, submitted to the AEC in March, 1962, charted then-current deficiencies in the water supply system and possible ways to remedy them. Among other recommendations were a new transmission line to Los Alamos via White Rock and Pajarito Road and deep wells in the vicinity of White Rock.

The first well in the Pajarito Mesa well field was drilled in 1964 near the junction of State Road 4 and East Jemez Road. Its specific capacity was superior to the wells in Guaje and Los Alamos Canyons. However, drilling verified the presence of a very thick bed of basalt which filled an ancestral canyon of the Rio Grande underlying the White Rock area. At this point, Bill Purtyman, of the U.S. Geological Survey, recommended a very deep well near the TA-18 Pajarito Site.

"Purtyman's Pajarito Wildcat," as it has been called, went into production late last month with a capacity of about 1400 gallons per minute, or two million gallons per day. It has more than twice the capacity of any other Los Alamos well and requires a 600 horsepower deep-well turbine pump set at a depth of more than 900 feet below the surface of the ground. This well is the equivalent of four wells of the early Los Alamos Canyon type, according to Dean Miller, Zia's assistant utilities and engineering chief.

Drilling of Pajarito Well No. 3 is also complete, but it still needs to be equipped. A fourth well is also projected. Depending on production of these four, a fifth and sixth well in this field may or may

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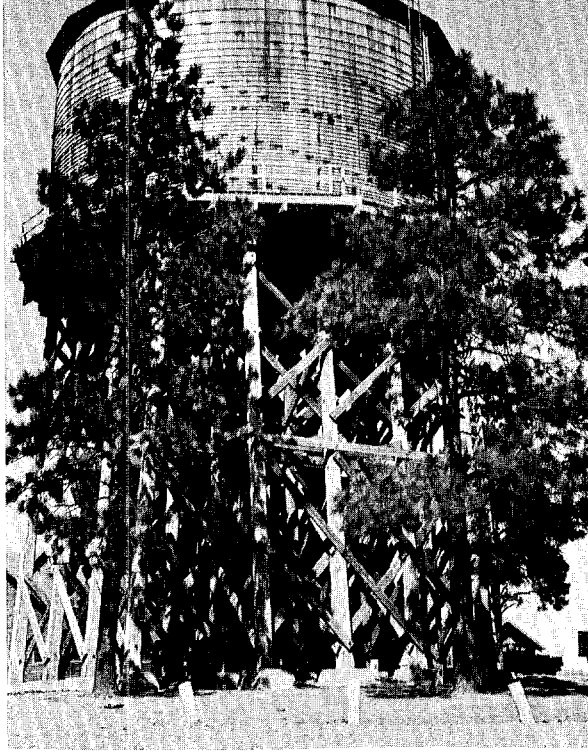
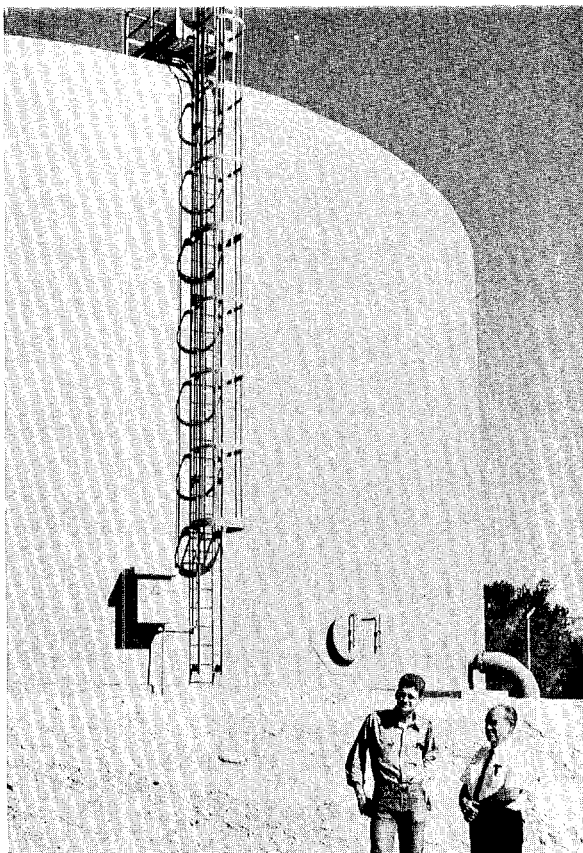


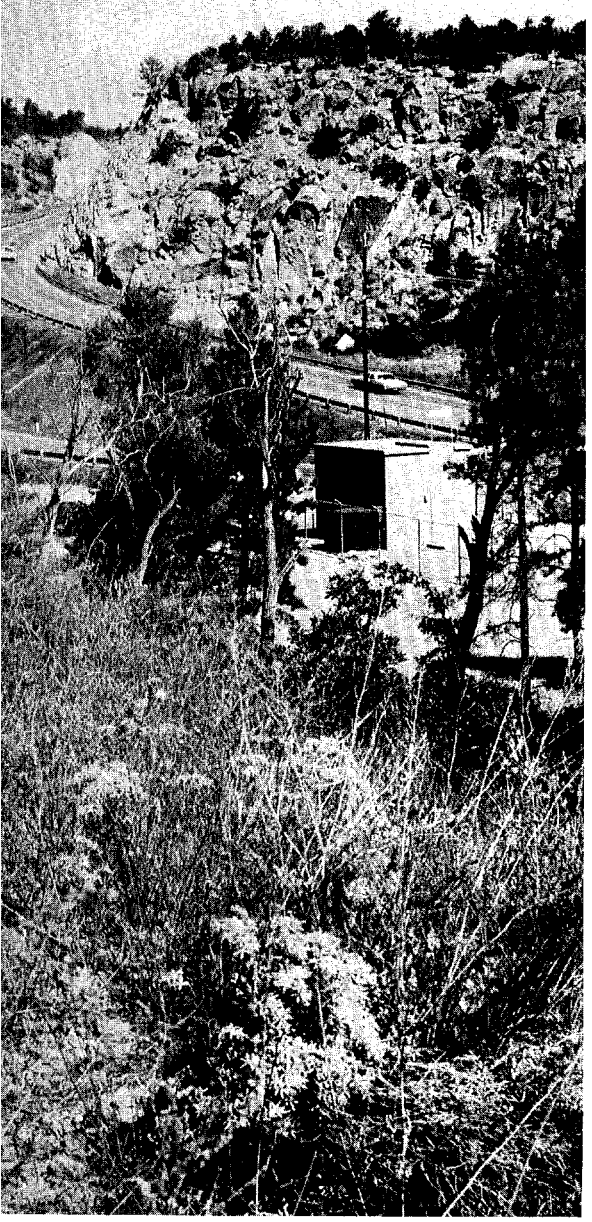
THE OLD . . .

The Hill's first water tank, a rustic wooden structure near the Lodge, was torn down in the mid-'50's.

. . . AND THE NEW

Crume and T. W. Roehl, AEC LAAO project engineer, are dwarfed by 1¼-million gallon storage tank at Pajarito No. 2.





Pajarito Well No. 2, Los Alamos' newest and largest water well, boasts more than twice the capacity of any other Los Alamos well. TA-18 Pajarito Site is nearby.

Water Supply . . .

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not be needed. All in all, the Pajarito Mesa water project will add four million gallons to terminal storage capacity when complete. The first increment of the project added two and one half million gallons' production, and it is hoped to have more than one million gallons' production per day from Pajarito Well No. 3, slated to go into operation by the end of fiscal year 1967.

The AEC, in its long-range program, intends to fully develop a well-field capacity of about 13 million gallons per day. Full production would be topped only during the early summer when continuous pumping may be required. During other periods of the year, the expanded well production will permit selective pumping to protect the aquifer and provide movement of water to Los Alamos at times of low electric power demand.

Based on the most recent report of the AEC, peak well production has been six million gallons per day, and peak demand has been as high as seven and a half million gallons per day, necessitating use of reserve storage. The Tech Area, perhaps surprisingly, required only two million gallons of the peak demand. At White Rock, the peak demand has been one and a half million gallons per day.

The new Pajarito Mesa water line will increase water supply potential by 60 per cent and will add another five million gallons per day to the capacity to pump. This should provide an adequate water supply at least through the next decade, AEC believes. Zia's Dean Miller agreed, saying that "the new Pajarito transmission line will provide a water supply loop for the Tech Area as well as the townsite, and will help to overcome future water supply problems. An added benefit will be its ability to backfeed water from the booster-tank storage reservoir down to White Rock, in event other sources of water should fail." White Rock is now supplied from both Los Alamos Canyon well field and the Pajarito No. 1 well.

Also included in the new water system are features which prevent backflow of the Tech Area Site water system with the domestic lines which feed residential areas of the community.

How will the community transfer program affect the water system? The supply, production, transmission and terminal storage will remain a responsibility of the AEC. Distribution of water within the townsite will be a county function. As of now, the county operates the water distribution system under contract to the AEC; it is hoped the county will be able to assume managership of this utility by June 30, 1967. The maintenance and operation of the water system now is under the Utilities and Engineering Division, Zia, headed by R. C. Crook, which manages pumping and delivery of water to terminal storage.

Coupled with the confidence officials feel about the future abundance of water for Los Alamos is the plea that everyone conserve water whenever and wherever possible. Officials of LASL, Zia, AEC, schools and other organizations have recommended a number of methods that might be employed to this end. One such example is the use of water from Los Alamos Canyon for irrigation of public lawns.

Co-op Sale Plans Outlined; First Offer Due This Month

By BARBARA STORMS

Although the first general offer of Los Alamos apartment houses will be made to cooperative organizations about October 21, it is quite possible that sales will not be completed until May, 1967, and in any case could not be closed before the first of the year.

This time factor was brought out in discussions with a panel of experts which met late in September to answer questions on cooperatives and the sale from all interested persons. On hand for the questioning were George A. Browne, assistant director for cooperative housing for the Federal Housing Administration in Washington, Daryl Mabee and Bill Dunn of the Department of Housing and Urban Development, John Schroer of the AEC's Community Disposal Branch and Sally Gerety, AEC counsel. Despite apparent confusion on the conduct of the sale, however, relatively few people—an estimated 30 or so—showed up for the talks.

The extended sale procedure will go something like this:

A general offer will be made by the AEC about October 21. Cooperatives will then have 30 days in which to request priority certification from the AEC. The application will require the cooperative to submit copies of its articles of incorporation, by-laws, the lease-type three-year occupancy agreement with each of its members, subscription agreements with each of its members, and evidence that all project-connected occupants of the buildings have been afforded equal opportunity to join the co-op.

First priority will go to the organization meeting all AEC requirements whose members make up a majority of the occupants of each building for which application is being made. All members must have been project-connected and occupying the buildings at the time of the general offer.

The time required by the AEC to verify the submitted information and certify priority could take weeks, depending on the size of the co-ops and the condition in which the application is submitted. The AEC has said that the applicants may be required to submit additional information or documents within a specified length of time if it is deemed necessary to clarify the application. Additional time also will be required for large cooperatives submitting names of hundreds of members whose occupancy and employment must be double-checked by AEC. Once priorities are certified and posted, a ten-day appeal period will be allowed, and appeals could delay the sale still further.

When priorities are final, each priority holder (co-op organization) will receive from DHUD a specific offer of the buildings for which it has applied. As in all previous sales, the offer will include an automatic discount of 15 per cent of the appraised value of the property and an additional ten per cent discount if the buyer wishes to waive the indemnity provision contained in the Atomic Energy Community Act. DHUD will allow up to 93 days for completion of the sale, during which time the cooperative must complete its membership list to include 100 per cent of the building occupants and arrange for financing.

If other financing is not available, buyers can borrow up to 97 per cent of the sale price from DHUD if they meet FHA requirements. Loans from DHUD may also include additional money for repairs or for the rehabilitation, modernization or enlargement of the property.

For an FHA-insured loan, the cooperatives will be required to undergo thorough scrutiny of their proposed operation—the by-laws, budget and improvement plans, if any—and professional management will be required. The FHA provides standard forms for every required document, including certificates of incorporation, by-laws, subscription agreements, occupancy agreements, information bulletins, mortgages, construction contracts and so forth.

There will be no restrictions on cooperatives buying for cash other than those specified by the AEC; that is, they must be non-profit organizations whose memberships consist of 100 per cent of the occu-

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Co-op Sale . . .

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pants, all of whom are project-connected. The cooperative must have a minimum potential membership of eight.

FHA's Browne said formation of large cooperatives for ownership of many units is encouraged, though not required, because FHA feels they are more stable than small ones. Browne pointed out that operation of a large organization is more economical and provides a large selection of people from which to choose well qualified members for the board of directors. He added that the big organizations are more democratic. "We find when a majority of a large cooperative elects to make a change, it is usually for the better. It doesn't always work that way in small co-ops."

Browne said the provision to sell apartments to cooperatives was included in the Los Alamos amendment to the Atomic Energy Community Act in an effort to spread the benefits of the bargain-rate real estate sales among as many people as possible. In Oak Ridge and Richland, where a far smaller percentage of people lived in apartments, the buildings were sold to investors.

Most people who questioned him, Browne said, wanted to know just what a cooperative is and how it works. There were other questions which could not be answered by any of the government agencies but would be dependent on the policies established by the cooperatives once the sale is concluded.

Among these was the question of eviction of occupants who choose not to join the cooperatives buying their buildings. AEC will require that all members of the purchasing co-op be occupants of the building and that all occupants be members of the co-op. In order to complete the sale, therefore, it will be necessary for the co-op to sign up potential occupants to replace the non-joining occupants. Eviction arrangements for non-joiners will be entirely up to the co-ops, subject to expiration of the occupant's present Zia Company lease.

Just what membership in a co-op will cost also will be an individual co-op matter. The membership costs are usually calculated to include a down payment to be collected from each member to provide the co-op with enough capital assets at mortgage closing time to meet the difference between the cost of the project and the mortgage amount, plus the amount required by FHA as a working capital deposit. Costs also include a monthly carrying charge calculated to produce an income sufficient to meet the estimated annual operating expense. Since cooperatives are required to be non-profit organizations, FHA claims monthly charges are nearly always lower than comparable rents, and down payments are seldom more than a few hundred dollars. This is particularly so, Browne said, in larger cooperatives which have lower operating costs and are better able to absorb vacancy losses.

Co-op members will each be required to sign a three-year occupancy agreement much like a lease, which states that the member agrees to pay the cooperative a carrying charge equal to his proportionate share of the sum required to meet annual expenses, and which specifies the repairs and maintenance to be performed by the cooperative as well as those which are the responsibility of the member. Browne pointed out that while the three-year commitment is longer than any lease previously required by Zia, it is considerably shorter than the 25 years or so required on a conventional home mortgage.

Should a member wish to move, his membership can be sold either for him by the cooperative or by him on the open market. Although co-op members must be project-connected at the initial sale, subsequent memberships can be sold to anyone who intends to occupy the apartment himself.

Down payments made by members when signing the occupancy agreement will be held in escrow and refunded should the co-op fail to meet the requirements and close the sale.

Browne said he could foresee no particular difficulties with the Hill's cooperative housing venture but said it will "be interesting to see what develops." At this point, he said, no one knows what is going to happen. "We don't know how many co-ops will be formed, how big they'll be, how successful they will be in completing their memberships, or how costs will run. We'll just have to wait and see."

Any apartments not sold to the first priority holders at the initial offer will be re-offered later to second priority holders which will be cooperatives whose membership is less than a majority of occupants. Any buildings remaining after the second offer will be up for grabs—offered to anybody anywhere on sealed bids.

As of September 26, the State Corporation Commission still had registered only two housing cooperatives for Los Alamos, but whether they will be the priority holders remains to be seen. With the general offer only three weeks away, the panel felt time was growing short for formation of new co-ops in view of the many and complicated requirements for AEC, FHA and the state.

LASL Museum Attracts Tourists, Scientists Alike

By BILL RICHMOND

Possibly the only room in the world containing a reactor . . . a railroad . . . and a cube of solid gold valued at more than $10,000. Plus atom bomb casings on the patio.

This is the science museum of the Los Alamos Scientific Laboratory.

Located between the Administration and Personnel buildings, LASL's science hall and museum observed its first anniversary at its new site last month. And indications are 1966 will be a record year in the number of visitors touring the museum.

A science museum in Los Alamos was initially opened to the public in August, 1963, in AP building—which has since been razed. In September of last year the museum moved into the new quarters on South Mesa and was officially opened for business on Labor Day, 1965.

Bob Brashear, museum manager, reports the 1966 visitor count at the science hall through August of this year totaled 39,792. This compares with a total of 25,002 visitors to the facility for the entire 1965 calendar year. Brashear predicts the visitor total for this year will be about 45,000, with a number of persons expected to return as "repeat" customers.

The most popular exhibits on display—especially with the younger set—are those which are animated. This includes the reactor replicas of Jezebel and Godiva and the scale model of the "Jackass & Western Railroad." This miniature version of the world's slowest railway is modeled after the real thing at the Nevada Test Site where it is used to transport Kiwi reactors to the test cells.

The gold cube is part of a display, which—together with cubes of other materials such as uranium, copper and lead—is used to demonstrate the varying weights of elements. Museum visitors are invited to lift the three-inch cubes to see for themselves the difference in weight. The gold cube is locked in a safe when not on display.

August was the busiest month for the museum since the doors were first swung open to visitors. Brashear said 11,392 persons signed the guest book and toured the science hall during August. The tours of the museum are conducted by guides who are either members of the community relations staff or —in the summer "busy" season—Los Alamos school teachers.

Robert Porton, community relations officer, said the guides have done more to build the image of the

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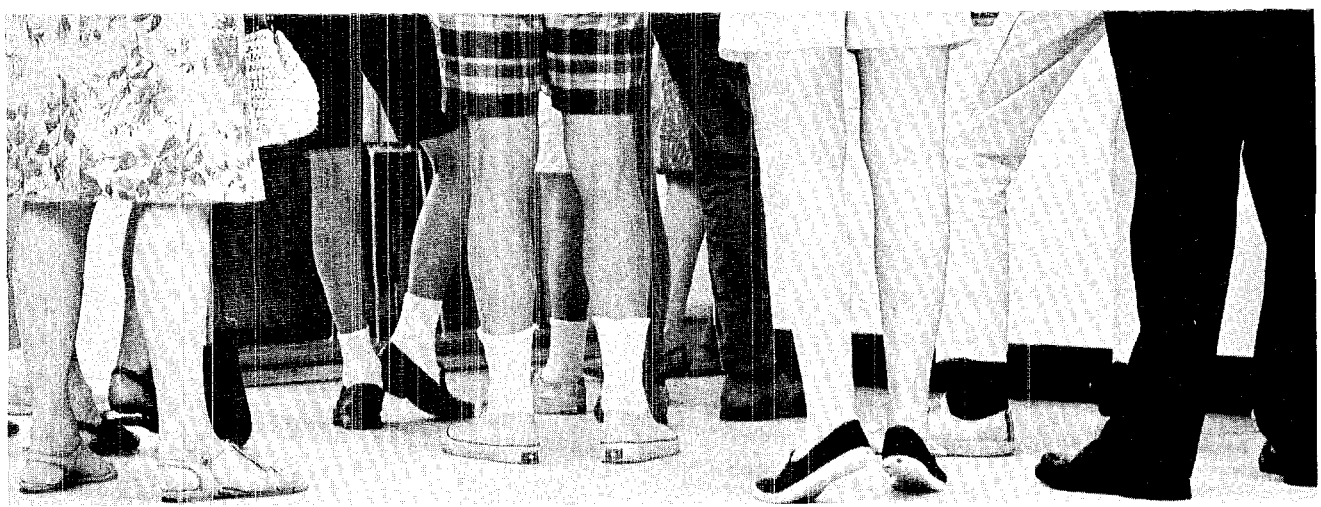


Pinocchio—an exhibit which illustrates a chain reaction by the use of ping pong balls—is a particular favorite of youngsters visiting the science hall. Pinocchio was so-named, Brashear said, "because it wishes it were a real reactor."

Museum . . .

continued from preceding page

museum than the exhibits. "We are very proud of them," he said, "and we have received many letters commending them for their courtesy."

During the three years the museum has been open, visitors have come from all 50 states and more than 60 foreign countries. They have included scientific and military leaders plus top government officials of a number of nations.

New exhibits are continually being added to the museum area, and plans have been made to increase the exhibit space with an annex. This new wing will include a "satellite room" and a lecture room for visiting groups and will be constructed south of the present museum. It will add about 2,500 square feet of space.

The "satellite room" will emphasize the contribution LASL has made to space exploration.

In another effort to improve the museum, a "Science Museum Advisory Committee" was recently formed to confer with Brashear and Porton on exhibits and the operations of the museum. The following have agreed to serve on the committee: Harold M. Agnew, W-DO; George A. Cowan, J-11; Robert W. Drake, GMX-DO; Robert D. Krohn, D-8; Wright H. Langham, H-4; John H. Manley, RAJM; and L. Philip Reinig, ENG-DO.

Brashear, reviewing the progress made by the museum in its relatively short history, noted: "Cooperation of people throughout our Laboratory has made it possible for us to plan many additional exhibits which we will put on display as quickly as they are completed. These new exhibits along with our seven-day operating schedule should help us present a progressively broader view of LASL activities understandable to everyone, from school youngsters to visiting scientists, any time they can pay us a visit."

A class from Cumbres junior high in Los Alamos listened intently as Brashear explained the nuclear weapons exhibit. That is, all but one boy who appeared blase about the whole thing.

Walske Accepts Washington Appointment

Carl Walske, T-DOT theoretical physicist, is the new chairman of the AEC-Department of Defense Military Liaison Committee. After nomination to the post by President Johnson in early August, Senate confirmation of the appointment came September 12.

The Military Liaison Committee was established by the Atomic Energy Act to serve as the regular channel of communication between the Department of Defense and the Atomic Energy Commission on all atomic energy matters relating to the Department of Defense.

In his new position, which he assumed Sept. 15, Walske also serves as assistant to Secretary of Defense McNamara for atomic energy. In this capacity he is responsible for recommending policies and implementing approved plans and decisions concerning the U.S. nuclear weapon stockpile.

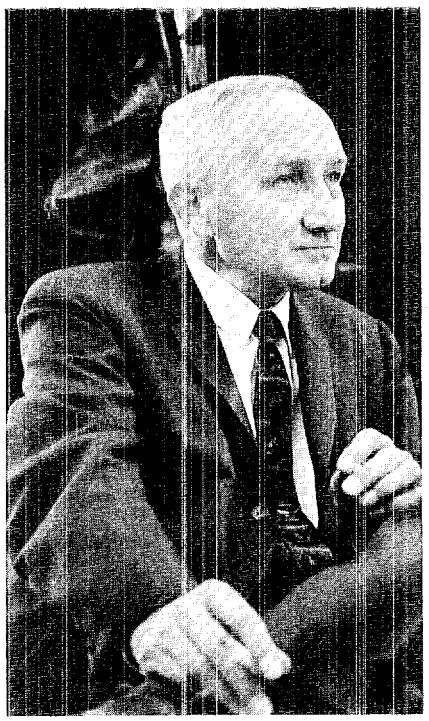
Walske has been a member of the T Division staff for the past year, and was also employed by LASL from 1951 to 1956. During the intervening years, he served in Paris as scientific attache with the United States mission to the Organization for Economic Cooperation and Development (1963-'65); in London as the scientific representative of the U.S. Atomic Energy Commission in the United Kingdom and Ireland (1961-'62); and in Geneva as the senior scientific representative of the U.S. Atomic Energy Commission on the U.S. delegation to the Conference on Suspension of Nuclear Tests (1959-'61). He also served for a year on the staff of the RAND Corporation, Santa Monica (1962-'63); and for three years as deputy research director of Atomics International, a division of North American Aviation, Inc. (1956-'59).

In addition, during the nine-year period he was gone from LASL, Walske also maintained an intermittent consultant agreement with the Laboratory.

Walske received his B.S. degree from the University of Washington in 1944 and his Ph.D. degree in theoretical physics from Cornell University in 1951, where he studied under Hans Bethe. Following his graduation from the University of Washington, he served as a naval officer in the South Pacific, returning to civilian life in June, 1946.

He is a member of the American Physical Society, American Nuclear Society, Phi Beta Kappa and Sigma Xi.

With his wife, Marjorie, and three children, Susan, 16, Steven, 14, and Carol, 11, Walske has moved to Washington, D.C., for the duration of the appointment. He will be on an indefinite leave of absence from LASL during this time.



Marshall Holloway, who spent 12 years at LASL and was considered one of the top authorities on critical assemblies, paid a visit to The Hill last month. Now vice president in charge of research for The Budd Corporation, Holloway was with the Laboratory from 1943 to 1955. While here, he worked with B, M and W divisions, serving for a time as B division leader.

Walske

Six Los Alamos Patents Released

Six patents by Los Alamos people are among 56 held by the Atomic Energy Commission which were made available for public use last month by the Commission.

Included are the following patents: "Modified Marx Generator," by A. E. Schofield, P-14; "Evaporation-Condensation Heat Transfer Device," by G. M. Grover, N-5; "Radiation Dosimeter System Using Cadmium-Backed Copper Foil," by L. J. Carr, H-4, R. D. Hiebert, P-1, and E. R. Ballinger, formerly of LASL, together with P. S. Harris and J. H. Larkins of Santa Fe; "Columbium Brazing Alloy," by C. A. Javorsky, CMB-6, with J. S. Howe, Albany, Oregon; "Diffusion Bonding Tungsten to Tungsten," by R. I. Batista, formerly of LASL, and G. S. Hanks, CMB-6; and "Pancake Reactor," by G. M. Grover.

The AEC has now released 3733 patents and patent applications for licensing.

The Technical Side

American Industrial Hygiene Asociation, Annual Meeting of Pacific Northwest Section, Idaho Falls, Idaho, August 26:

"Respiratory Protective Devices" by E. C. Hyatt, H-5. (Invited paper)

Faculty-Student Conference, Argonne National Laboratory, Lemont, Illinois, August 31:

"Nuclear Explosions as a Pulsed Source" by B. C. Diven, P-3.

Second International Biophysics Congress of the International Organization for Pure and Applied Biophysics, Vienna, Austria, September 5-9:

"A New Staining Technique for Ultrastructure Research" by J. H. Manley, DIR-OFF.

"Radiation Chemistry in Ultrastructure Research" by J. H. Manley, DIR-OFF.

"Stimulation of Competence of **Hemophilus Influenzae** by a Cell-Free Factor(s) from Competent Cells" by B. J. Barnhart, H-4.

Ninth International Conference on Coordination Chemistry, St. Moritz-Bad, Switzerland, September 5-9:

"Force Constants and Bonding Properties in Metal-Cyanide Complexes and Metal Carbonyls" by L. H. Jones, CMF-4. (Invited paper)

American Geophysical Union, Western National Meeting, Los Angeles, Calif. September 7-9:

"Orientation of the Plasma Sheet in the Earth's Magnetotail" by S. J. Bame, J. R. Asbridge, H. E. Felthauser, E. W. Hones, Jr., and I. B. Strong, all P-4.

"Parameters of the Solar Wind from Vela III Measurements" by I. B. Strong, J. R. Asbridge, S. J. Bame, H. E. Gilbert, all P-4, and A. J. Hundhausen, T-12.

First International Congress of the International Radiation Protection Association, Rome, Italy, September 5-10:

"Estimation of Radiation Protection Guides: Interspecies Correlations" by C. R. Richmond and J. E. Furchner, both H-4.

International Conference on Magnetic Resonance and Relaxation, XIV Colloque Ampere, Ljubljana, Yugoslavia, September 6-11:

"Nuclear Magnetic Relaxation Measurements of Oxygen-17 Enriched H_2O and D_2O" by A. B. Denison, University of Wyoming, and S. W. Rabideau, CMF-2.

North American Symposium on Electromagnetic Isotope Separation, Oak Ridge, Tenn., September 7-9:

"The Los Alamos Isotope Separator" by B. J. Dropesky, J-11.

One Hundred Fifty-Second National American Chemical Society Meeting, New York, N.Y., September 11-16:

"Tetra- and Pentavalent Actinide Flouride Complexes, Protactinium to Cirium" by R. A. Penneman, L. B. Asprey, and T. K. Keenan, all CMF-4. (Invited paper)

"Preparation and Properties of Some Tetravalent Praseodymium Compounds" by L. B. Asprey, J. S. Coleman, and M. J. Reisfeld, all CMF-4.

"The Flash Photolysis of Ozone in the Presence of Isotopically-Enriched Water Vapor" by Rolf Engleman, Jr., GMX-2.

"Determination of Vaporization Phenomena by a Continuous Method" by C. C. Herrick, CMF-13. (Invited paper)

"The Deuteron Magnetic Resonance of Polycrystalline Deuteroammonia" by S. W. Rabideau and P. D. Waldstein, both CMF-2.

"A Review of the Kinetics of the Aqueous Oxidation-Reduction Reactions of Uranium, Neptunium, Plutonium, and Americium" by T. W. Newton and F. B. Baker, both CMF-2. (Invited paper)

International Conference on Nuclear Physics, Gatlinburg, Tenn., September 12-17:

"A High Resolution Study of Inelastic Proton Scattering from Nuclei in the Pb Region: the 2.6-MeV Octupole State" by J. C. Hafele, P-DOR, and Richard Woods, P-9.

"Total Reaction Cross Sections for 14.5 MeV Protons from 22 Separated Isotopes of Ti, Fe, Ni, Cu, Zn, Zr, and Sn" by G. J. Igo, P-DOR, J. F. Dicello, P-12, and M. L. Roush, Univ. of Maryland.

"Direct and Compound-Nucleus Reactions for $^{32}S(d,p)^{33}S$ at low Energies" by R. B. Leachman, P-12.

"The Determination of Small Widths in the Continuum" by W. R. Gibbs, T-9, Peter Fessenden and R. B. Leachman, both P-12.

"A Comparison of Rotational M1 Transition Rates Between High and Low Spin States" by G. G. Seaman, E. M. Bernstein, and J. M. Palms, all P-DOR.

"Further Evidence for Effective Nucleon Spin g-Factors" by J. M. Palms, E. M. Bernstein, and G. G. Seaman, all P-DOR.

Symposium on Intense Neutron Sources, Santa Fe, N. M., September 19-23:

"Prospects for High Current Accelerators" by D. E. Nagle, MP-4.

"The Nuclear Explosion as a Single Burst Neutron Source" by B. C. Diven, P-3.

"An Intense Source of Neutrons from the Dense Plasma Focus" by J. W. Mather, P-7.

Ninth AEC Cleaning Conference, Harvard University, Cambridge, Mass., September 14-16:

"Aerosol Characteristics of Burning Plutonium" by H. J. Ettiger, W. D. Moss, both H-5, and H. M. Busey, formerly K-DO.

Fifteenth International Congress on Occupational Health, Vienna, Austria, September 19-24:

"The Contribution of Industrial Hygiene to the Protection of the Radiation Worker" by H. F. Schulte, H-5.

"Correlation of Urine Assay and Air Sampling Data" by H. F. Schulte, H-5.

Symposium on Gastrointestinal Radiation Injury, Richland, Wash., September 25-28:

"Movement of Discrete Particles in the 100- to 200-Micron Diameter Range Through the Gastorintestinal Tract of Mice, Rats, Dogs, and Man" by C. R. Richmond and J. E. Furchner, both H-4. (Invited paper)

Seminar on Computer-Aided Design, Honeywell, Inc., Waltham, Mass., September 26:

"NET-1 Network Analysis Program" by A. F. Malmberg, T-7. (Invited paper)

ASME, Fluid Meters Golden Jubilee Conference, Pittsburgh, Pa., September 26-28:

"The Calibration of Flowmeters with Liquid Hydrogen in the Region Between 1000 and 7000 GPM" by D. H. Liebenberg, R. W. Stokes, and F. J. Edeskuty, all CMF-9.

Tenth Conference on Analytical Chemistry in Nuclear Technology, Gatlinburg, Tenn., September 27-29.

"Purification of Transplutonium Actinides Produced in Underground Thermonuclear Explosions" by Kurt Wolfsberg and W. R. Daniels, both J-11.

"Determination of Oxygen and Carbon in Sodium by Gamma-N Activation" by D. M. Holm, K-1, J. M. Williams, K-2, and W. M. Sanders, K-1.

"Dissolving Procedure for Rover Fuel Element Samples" by J. W. Barnes, J-11.

Culled from the files of The Los Alamos Times by Robert Y. Porton

Ample Water Supply Assured Hill

An ample supply of water to meet Los Alamos' industrial and household needs was assured residents by Col. Arthur C. Nauman, Post Operations Officer. The second of three wells to serve the new 14-inch line has been brought in at the lower end of Guaje Canyon along the Espanola Road.

The announcement brought an end to the community's water uncertainties.

Residents could forget the days of the big freeze, when the line yielded not a drop for weeks on end. They could forget about the bucket brigades when trucks parked by the water tower and yielded their precious cargo to distraught housewives burdened with pans and buckets.

WAC Unit Bids Farewell

The Hill's WAC detachment was inactivated this week. All members left Los Alamos for separation from the service at Fort Sam Houston, San Antonio, Texas. Leading the group for discharge was M/Sgt. Jane Heydorn.

Henry Hoyt Named Aide to Col. Betts

Henry R. Hoyt has been appointed assistant to the associate director, Col. Austin W. Betts.

A graduate of Harvard University, Hoyt entered the Army in 1942. He held the rank of major in the Western Flying Training Command. A native of New York, Mr. Hoyt has resided in the Southwest for the past 10 years.

240 More Housing Units Authorized

Authorization to erect 240 additional prefabricated houses on the project was received by Post Headquarters from Manhattan Engineer District Headquarters in Washington. Addition of the 240 units to the 300 permanent homes now under construction by the old golf course is expected to alleviate The Hill's housing shortage.

The prefabs are to be brought here from Fort Leonard Wood at Rolla, Missouri.

Each unit is 24 by 28 feet, and contains living room, kitchen, bath and two bedrooms.

"A Rose by Any Other Name"

The name "Hilltoppers" as used by The Times, refers to the Los Alamos High School football team. High school partisans insist upon calling the team the "Atomic Bombers."

For the sake of clarity and originality, The Times will continue to call the High School gridders the "Hilltoppers."

Brixner Honored by Movie, TV Engineers

Berlyn Brixner, GMX-9 group leader, was presented the 1966 E.I. du Pont Gold Medal Award by the Society of Motion Picture and Television Engineers at the society's annual technical conference in Los Angeles October 3. The award was made in recognition of Brixner's work in high-speed photography, photoinstrumentation and automatic lens design.

Brixner has designed and built a number of high-speed cameras—capable of taking as many as 15 million pictures per second—used in LASL studies of explosives. Several of his designs for rotating mirror streak cameras and rotating mirror framing cameras have served as starting points for commercial development of equipment now used in research projects throughout the world. In addition to his work with high-speed cameras, Brixner developed several new methods of lens design suited to high-speed computers. He has been granted patents on a camera and a shutter.

Brixner joined the Laboratory in 1943. During the war he worked with Dr. J. E. Mack in devising special instruments for scientific photography. He helped photograph the Trinity and Eniwetok tests and since 1946 has headed GMX-9. A native of El Paso, Texas, he attended the El Paso College of Mines and Metallurgy and the University of Texas.

Brixner

Rouse Awarded Medal For Work in Rheology

Prince Rouse, GMX-2, has been named the 1966 winner of the Bingham Medal, it was announced recently by the American Institute of Physics.

The award, granted by the Society of Rheology, a member society of AIP, is given annually to a scientist who has made a notable contribution to rheology, the development of the science of the deformation and flow of matter.

In making the selection, the Bingham Award committee stated that Rouse's paper, "Theory of the Linear Viscoelastic Properties of Dilute Solutions of Coiling Polymers," which appeared in the Journal of Chemical Physics in 1953, "is becoming more and more to appear to be one of the select half dozen fundamental turning points in all high polymer theory."

Rouse, who has been with LASL since March, 1955, received his B.A. degree in chemistry from Central Methodist College, Fayette, Missouri, and his Ph.D. degree in physical chemistry from the University of Illinois. He is a member of the American Institute of Physics and the American Chemical Society.

Presentation of the award to Rouse will be made November 1 during the Society of Rheology meeting at Atlantic City.

Rouse

what's doing

TRAVEL SLIDE and FILM PROGRAM: Mesa Public Library.
- October 20, 7:30 p.m., "Madrid and its Environs," program by Bill Moss.
- November 3, 7:30 p.m., "Historic Houses of Santa Fe," program by Alan Vedder.

LOS ALAMOS FILM SOCIETY: "Shakespeare Wallah," Indian drama. October 19, 7 and 9:15 p.m., Civic Auditorium.

GEOLOGICAL SOCIETY: No charge, open to the public.
- Friday, Saturday and Sunday, October 14, 15, 16—field trip with New Mexico Geological Society. Taos, Rio Grande gorge, Questa moly mine in Sangre de Cristos, Red River Pass, Capulin Mountain National Monument, Folsum man site, Trinidad, Huerfano Park. Contact Leonard Treiman or Terry Walls.
- Tuesday, October 18, meeting at 7 p.m., high school Little Theater, speaker and exhibit of fossils.

PUBLIC SWIMMING: Los Alamos High School Pool, Adults 35 cents, children 15 cents. Saturday and Sunday 1 to 6 p.m., Monday, Tuesday, and Wednesday, 7:30 to 9:30 p.m.

OUTDOOR ASSOCIATION: No charge, open to the public. Contact leader for information about specific hikes.
- Sunday, Oct. 16, Apache Springs to Bandelier headquarters. Ken Ewing, leader.
- Saturday, October 22, southern route to Painted Cave. Avery Gage, leader.
- Saturday, Oct. 29, Upper Crossing to Jim Young's—20 miles (one day). Bob Skaggs, leader.

Service Awards Presented To 10-, 15-, 20-Year Employes

More than 200 LASL employes were honored for 10, 15 and 20 years of service to the University of California at a special ceremony September 15. Laboratory Director Dr. Norris E. Bradbury spoke briefly and presented service pins to each of the employes.

TWENTY-YEAR SERVICE PINS

Jack W. Aeby, H-6; Harold V. Argo, P-4; Karl S. Bergstresser, CMB-1; Charles Blaut, SD-5; Orba C. Booth, SP-4; Joseph D. Carter, CMB-11; Pascual P. Chavez, H-1; Willard F. Clark, SD-1.

Presciliano Dimas, GMX-2; James R. Ditto, GMX-3; George G. Everhart, P-3; Alan E. Florin, CMF-2.

James S. Gilmore, J-11; Robert R. Gilmore, CMB-11; J. Paul Glore, P-1; James K. Gore, CMB-6; Pierre F. Hartshorne, CMB-6; Arthur L. Henicksman, CMB-1.

Ogden S. Johnson, H-4; William R. Kennedy, Jr., H-6; John A. Kircher, CMB-8; Suzanne Krainock, CMF-4; Nerses H. Krikorian, CMB-3; Marion S. Lew, CMB-1; George J. Littlejohn, H-1.

Benny S. Martinez, H-1; Johnnie M. Martinez, GMX-4; Dean D. Meyer, H-1; Richard K. Money, CMB-3; Arthur N. Morgan, Jr., CMB-11; Lawrence J. Mullins, CMB-11.

Epimenio A. Pacheco, GMX-3; Lena D. Padilla, GMX-7; Alphonse Popolato, GMX-3; William F. Romero, H-1; Joe C. Roybal, CMB-11.

Fred R. Sandoval, CMB-7; James E. Sattizahn, Jr., J-11; James H. Schutz, SD-5; Thomas K. Seaman, CMB-11; Santiago F. Serna, CMB-11; Arthur N. Shopp, P-1; Robert E. Smith, CMB-8.

Robert L. Spaulding, GMX-7; Raymond E. Squires, SD-5; John J. Stahl, SD-2; Cecil Stevens, CMB-11; Roy D. Stone, D-8; Walter A. Unger, W-7; Billie J. Van Lyssel, P-1; Alvin D. Van Vessem, GMX-7; Jose A. Varoz, SP-8.

Larry Weintraub, K-4; Eugene E. Weiss, AO-1; D. Neil Whyte, ENG-2; Walter W. Wilson, CMB-1; Willard G. Writteman, CMB-3.

FIFTEEN-YEAR SERVICE PINS

W. Tyler Aldrich, D-4; Joe B. Apodaca, SP-3; Dale E. Armstrong, CMF-4; Richard J. Bard, CMB-8; Arthur J. Beaumont, CMB-11; Hazel B. Bechtol, W-1; Claude T. Blatti, SD-5; John N. Bombardt, SD-1.

John E. Boyer, Sr., SD-5; Donald H. Bradford, T-7; Daniel Brandt, SD-1; Lee S. Bridges, SD-4; Philip L. Browne, T-5; Louis C. Burkhardt, P-14.

Robert Canada, W-4; Roy P. Casey, SD-1; Leo G. Chelius, Sr., H-1; Robert H. Chrisman, SD-1; Ethel D. Cooper, K-DO; Theodore P. Cotter, N-5; Summers H. Cox, H-4; Tommy L. Crisler, CMB-6; Paul E. Criss, SD-5; William S. Cunningham, SD-5.

Joseph R. Dion, ENG-4; Robert P. Doddridge, SD-1; Grove S. Dow, Jr., GMX-3, Frederick J. Edeskuty, CMF-9; Robert J. Elliott, H-1; Leon B. Engle, N-2; Douglas F. Evans, GMX-3.

Ernestine T. Farrar, H-2; Harry E. Felthauser, P-4; Harry G. Ficht, CMF-9; Wildon Fickett, GMX-10; Lucille A. Freidline, AO-5; James H. Fretwell, CMF-9; Robert K. Ginder, SD-5; Gordon C. Gray, SD-5.

Raymond J. Hanson, N-4; John P. Harrison, SP-10; Virden F. Hays, CMB-7; William S. Heath, GMX-3; Stella J. Herrera, AO-1; C. Gordon Hoffman, N-1; LeRoy C. Horpedahl, W-1; James D. Hudgins, D-8.

Archibald E. Irelan, SD-5; Llewellyn H. Jones, CMF-4; Chester S. Kazek, Sr., GMX-3; Chester S. Kazek, Jr., T-1; Thomas K. Keenan, CMF-4; Philip G. Koontz, N-2.

Herbert C. Lauf, SD-5; Robert B. Leachman, P-12; James C. Little, W-1; Elbert H. Loewenstein, SD-5; Alfonso Lucero, SP-3.

Maurice W. McCloskey, SD-5; Raymond N. McDonald, ENG-2; Juan E. Martinez, GMX-8; John W. Means, SD-5; Camilo E. Medina, K-DO; Paul E. Miller, GMX-3; William N. Miner, CMF-5.

James B. Newville, SD-1; Maxine I. Nims, CMB-14; Kenneth W. Nyquist, SD-5; J. Robert Penland, H-3; Vosbert A. Peters, SD-5; Carl E. Peterson, CMB-6.

Lourdes A. Rendon, H-1; Edward M. Riggs, SD-1; William D. Roberson, SD-1; Thomas R. Roberts, CMF-9; Ernesto V. Romero, CMF-9; Daniel Roybal, CMB-6.

Pres E. Salaz, D-8; Miguel A. Sandoval, AO-5; Mirl D. South, CMB-AS; Louis C. Speer, H-1; Vernon L. Stewart, SD-5; Laura L. Stone, T-1; Dante V. Susco, W-4; George S. Szalay, SD-1.

Raymond E. Tate, CMF-5; N. James Terrell, P-DO-R, J. Karl Theobald, J-10; Albert E. Tilby, SD-4; Jose R. Trujillo, CMB-14.

Bartolo Valdez, CMB-6; Robert G. Wagner, N-2; Harvey J. Walker, GMX-3;Edward J. Wiewandt, W-1; Lee Ella Williams, SP-8; Donald D. Wilson, SD-5; John O. Winks, J-3.

James L. Young, III, GMX-7; John A. Zastrow, SD-5, Raleigh E. Zellers, GMX-3; Mary M. Zellman, SD-O.

TEN-YEAR SERVICE PINS

Jerry E. Allen, J-14; Edgar A. Bacon, Jr., DIR OFF; Arthur G. Bailey, N-4; Loretta M. Baldridge,

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service awards . . .

continued from preceding page

W-7; George Balog, CMB-3; Albert H. Barlich, W-4; Robert C. Beiler, J-3; John H. Bender, Jr., K-2, Camille F. Bidwell, H-4.

Lucien M. Black, J-16; Forrest W. Brinkley, Jr., T-1; Sidney H. Brower, GMX-4; Byron M. Carmichael, K-1; Thomas A. Carroll, SD-2; Glenn L. Carter, T-1; Edward L. Cleland, GMX-3; Concha B. Collier, CMB-1; Rodger S. Connellee, ENG-1; Roberta J. Crouse, SP-12.

Dorothy M. Daily, D-8; John E. Deverall, N-5; Bennie E. Duran, SP-2; Theodore E. Ehrenkranz, H-3; Edward O. Ferdinand, SD-2; Paul R. Franke, Jr., DIR OFF.

Johnnie E. Gallegos, J-14; Ramon N. Garcia, GMX-3; Arlin R. Givens, Jr., J-3; Walter D. Gould, J-10.

Donald M. Hall, ENG-2; Elizabeth Hansbury, H-4; Robert S. Harper, Jr., D-8; Betty J. Harrington, W-3; Herbert H. Helmick, N-2; Gilbert R. Herrera, SP-3; Claude C. Herrick, CMF-13.

Darell L. Ingwerson, GMX-7; Donald H. Janney, GMX-11; Joseph E. Kemme, N-5; John Knapp, CMB-7; Lawrence F. Krenzien, J-8.

Thomas E. Larson, GMX-2; Charles A. Linder, N-3; Robert E. Luders, P-9; Argyle D. McGillivray, GMX-3; Herman R. Maltrud, W-7; Charles E. Manger, MP-3; Benny A. Martinez, SD-O; Eleanor L. Martinez, D-8; Nicolas Martinez, PER-4; Edna E. Marx, H-1; Restus J. Miller, H-1; Peter R. Mondragon, GMX-6.

Frank D. Newcom, SD-2; Matthew J. O'Keefe, D-8; Gilbert R. Ortiz, M&R; Barbara J. Pacheco, SP-12; Jewell N. Pederson, GMX-7; Robert Y. Porton, PUB.

Harold E. Rayburn, SD-1; Jack R. Richard, H-1; Dick Rodriguez, GMX-3; Donald G. Rose, N-1; Doyle W. Rottmayer, SD-2; Johnnie A. Roybal, M&R.

Bessie M. Sanders, SP-3; Secundino Sandoval, CMB-7; LeRoy W. Schiller, ENG-2; Garry L. Schott, GMX-7; Patsy R. Shannon, T-1; Robert R. Sharp, Jr., J-6; Myron L. Stein, T-7; Orin W. Stopinski, H-6; Charles S. Summers, N-5.

Jose N. Tafoya, GMX-3; Vernon L. Trexler, J-14; Philip J. Trimmer, GMX-3; Eliza Trujillo, SP-12; Jacobo O. Trujillo, GMX-4; Jeanette M. Verre, H-DO; John H. Warren, J-16; Joseph W. Woolsey, Jr., K-3; R. Keith Young, W-1.

new hires

CMB Division

Joe R. Abeyta, San Juan Pueblo, N.M., CMB-AP

James L. Anderson, Tallahassee, Fla., CMB-3 (Rehire)

Robert K. Fisher, Denver, Colo., CMB-6 (Casual-Rehire)

Alan L. Embry, Los Alamos, CMB-7 (Rehire)

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Donald H. Lester, Dobbs Ferry, N.Y., CMF-9

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Carole J. Harrall, Los Alamos, D-2

Sylvia S. Phillips, Los Alamos, D-2

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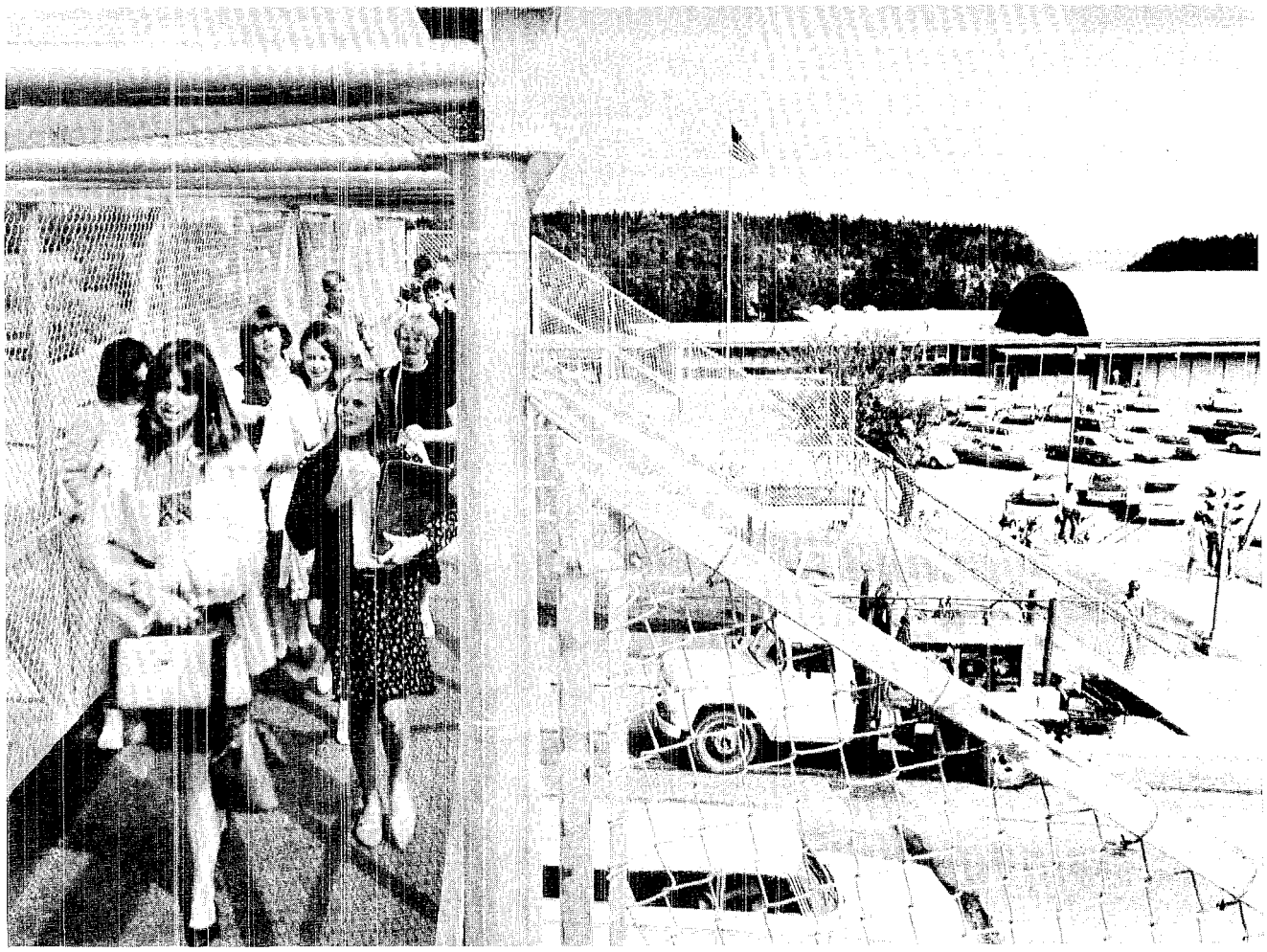

New foot-bridge just completed last month gets Pueblo junior high students safely across Diamond Drive.

About the back cover...

PUB's Bill Jack Rodgers produced this photo of fellow photographer Frank Berry, D-8, photographing an "eclipse simulator." D-8 was asked to make simulators of various sizes--to be used on various instruments--for test purposes in preparation for the upcoming solar eclipse expedition. It was a peculiarity of the lens shape that resulted in the five rings--actually there was only one. Berry said the displaced reflection of the simulator image caused the multiple coronas.

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